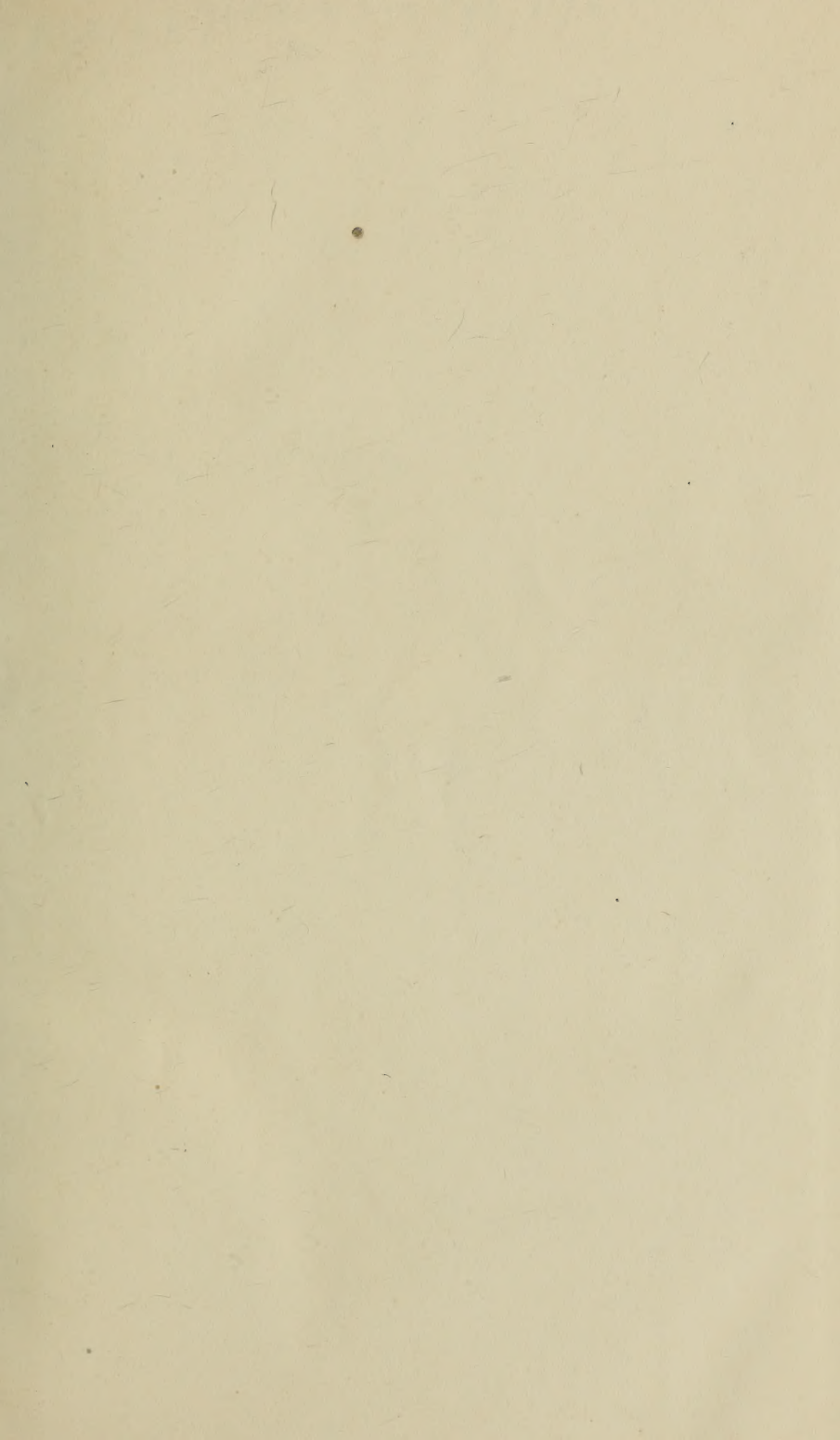
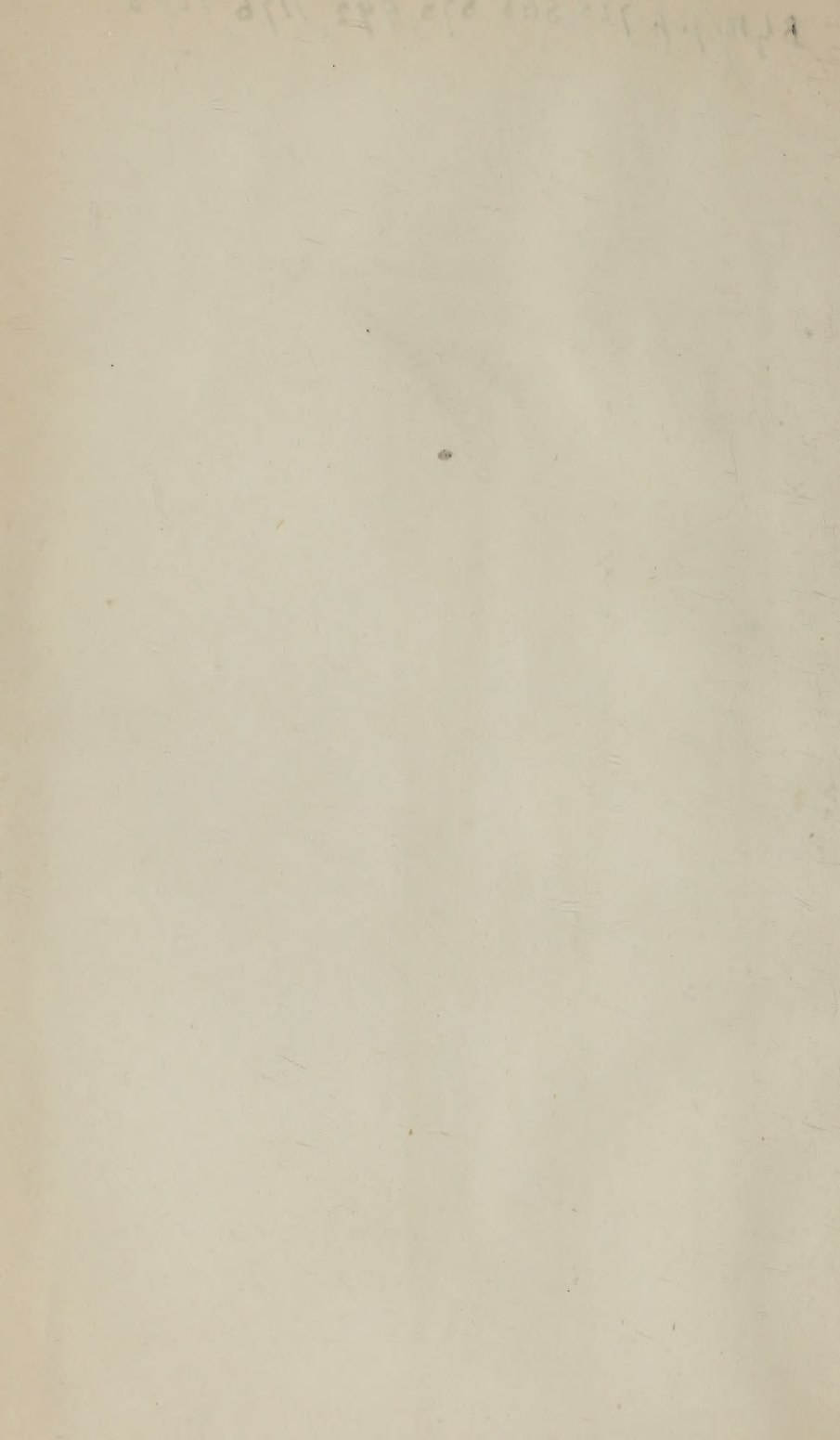


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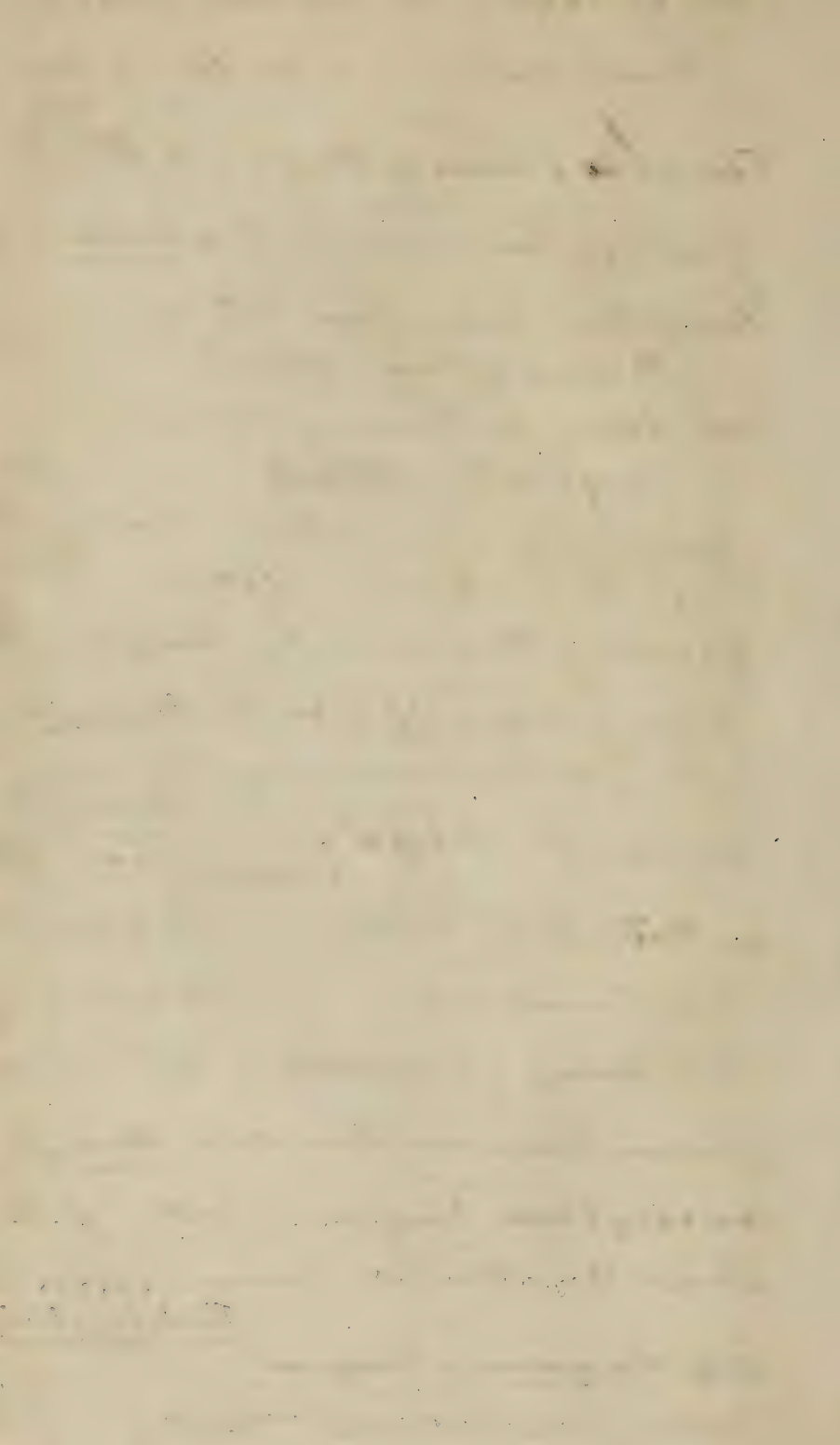
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OF THE

ASIATIC SOCIETY.

JULY, 1847.

CATALOGUE OF REPTILES

Inhabiting the MALAYAN PENINSULA and ISLANDS,

*Collected or observed by THEODORE CANTOR, Esq. M. D., Bengal
Medical Service.*

[Localities printed in Italics signify those from whence the animals of the Catalogue were obtained; in ordinary type those previously given by authors. The descriptions are in most cases taken from life; in the few in which it is expressly noted, shortly after death; in none from specimens preserved in spirits of wine.]

CHELONIA.

FAM. ELODIDÆ, OR MARSH-TORTOISES, *Dum. and Bibr.*

SUB-FAM. CRYPTODERINÆ, *Dum. and Bibr.*

GEN. GEOEMYDA, *Gray.*

Head covered with thin continued skin; chin not bearded. Legs strong, not fringed behind. Toes 5-4, strong, short, free, covered above by a series of shields; claws short. Tail tapering; shell depressed, three-keeled; hinder edge strongly toothed. Sternum solid, broad truncated before, notched behind; gular plate linear, band-like, small; axillary and inguinal plates small.

GEOEMYDA SPINOSA, (Bell.)

SYN.—*Emys spinosa*, Bell apud Dum. and Bibr.

Emys bispinosa, Schlegel.

Testudo emys, Müller?

Geoemyda spinosa, Gray.

Shell oblong, subquadrate, keeled, flattened above, chestnut coloured, front and hinder edge strongly serrated; vertebral plates broad, first suburceolate; costal plates with a posterior, subsuperior areola, with a slight subconic tubercle; beneath yellow, brown rayed; *young* depress-

ed, pale brown, bluntly keeled, with a distinct spine in the areola of each discal plate.

HABIT.—*Pinang Hills*.

Sumatra.

Two individuals were observed by the Hon'ble Sir William Norris, late Recorder of H. M. Court of Judicature in the Straits of Malacca, on the Great Hill at Pinang, at a distance from water. The colour of the shell is a dirty brownish ochre, here and there with sooty rays, which numerous intersect the concave sternum. The keel, the marginal spines, and the costal tubercles are nearly obliterated, and the shell presents frequent marks of corrosion. The larger individual is of the following dimensions :—

Length of the head,	1 $\frac{5}{8}$ inch.
Ditto ditto neck,	1 $\frac{5}{8}$
Ditto ditto shell,	8
Ditto ditto tail,	1 $\frac{2}{8}$

A large tick was firmly adhering to the throat of one of these tortoises, the presence of which however does not indicate an exclusively terrestrial life, as one species at least of the *Ricinæ* (*Ixodes ophiophilus*, Müller?) occurs on aquatic as well as terrestrial serpents. The following are the characters of *Ixodes geoemydæ*. The short sucker is depressed, slightly widening towards the bifid apex, and encased by the palpi. Above, and at a short distance from the latter, are two minute rounded fossæ. The cephalic, tetragonal plate is of a reddish brown colour, with a yellow spot at the posterior angle. The oval body is dark pearl-coloured. On each side close to the articulation of the posterior leg appears a small rounded horny plate. The legs are reddish brown with a yellow spot at each of the joints, except the last. Swollen, as the tick appeared, it measured six-eighths of an inch in length; half an inch in breadth.

GEN. EMYS, *Brogniart*.

Head moderate, covered with a thin hard skin; chin not bearded. Feet short, covered with scales; toes 5-4, strong, shielded above, webbed to the claws. Tail moderate. Shell depressed. Sternum solid, broad, truncated before, notched behind, affixed to the thorax by a bony symphysis, covered by the ends of the pectoral and abdominal plates; axillary and inguinal plates moderate, distinct.

A.—*Vertebral plates lozenge-shaped*.—Gray.

EMYS CRASSICOLLIS, Bell, MSS. apud Gray.

SYN.—*Emys crassicollis*, Bell, apud Dum. and Bibr.*Emys spengleri*, Var, Schlegel.

Shell ovate, oblong, rather convex, revolute on the sides and deeply toothed behind, black, slightly three-keeled; keels close; first vertebral plate elongate, six-sided; sternum flat, pale, and keeled on the sides; head and neck thick, black.

HABIT.—*Malayan Peninsula, Pinang.*

Sumatra, Java.

In Malayan individuals, numerous inhabiting rivulets and ponds in the valleys, the throat is whitish, and a small white spot appears on each side of the occiput. The vertebral keels and the lateral spines become obliterated with age. The largest individual observed was of the following dimensions:—

Length of the head,	1 $\frac{6}{8}$ inch.
Ditto ditto neck,	1 $\frac{6}{8}$
Ditto ditto shell,	9
Ditto ditto tail,	1 $\frac{1}{8}$

It feeds upon frogs and also upon shell-fish and animal offal. Old Malay women, who may be seen after every heavy fall of rain, spending hours, rod in hand, over the overflowing ditches, out of which their huts rise, are often ludicrously disappointed on perceiving this tortoise on the hook.

B.—*Vertebral plates broad, six-sided*. Gray.

EMYS PLATYNOTA,—Gray.

SYN.—“Kátong” of the Malays of the Peninsula.

Shell ovate, convex, yellow dotted, with the centre of the back quite flat, as if truncated; shields striated, nucleus central; vertebral shields broader than long, six-sided, 5th keeled; the front and hinder margin strongly toothed; sternum flat, truncated before; and slightly notched behind; tail moderate, tapering.

HABIT.—*Malayan Peninsula, Pinang.*

Sumatra.

Mr. Gray's description refers to the young animal, of which the length of the shell is given in *Proceed. Zoolog. Soc.* 1834. P. 54, as 9 inches. The representation of *Emys platynota* in *Illust. Ind.*

Zool. from its size, and the strongly toothed flat front and hind margins of the shell, also appears to be a young animal. The penultimate, the fourth, vertebral shield is represented as divided in two pieces, which if so in the original, must be accidental, as normally the fourth vertebral shield is six-sided, and in size nearly equalling the preceding. The nuclei of the costal shields are more central than represented in the plate.

In the living adult animal the head, neck, shell, tail and feet are of a dirty yellowish, or greenish brown, which becomes paler on the sternum. The nuclei of the vertebral shields are slightly raised. The costal shields are depressed, their sides sloping towards the nuclei, thus forming as it were very shallow hexagonal basins. The front and hind margins are broadly revolute, their toothed appearance worn off. The sternum is slightly concave in the centre. The largest individual was of the following dimensions :

Length of the head,	0 feet	3 inch.
Ditto ditto neck,	0	3
Ditto ditto shell,	1	$7\frac{4}{8}$
Ditto ditto tail,	0	$2\frac{4}{8}$

It lived in my garden at Pinang upwards of a twelvemonth, apparently without food, and it was never observed to enter a tank. The shell bears deep white marks of corrosion, in appearance like that observed in *Testacea* inhabiting stagnant water. The animal suffered itself to be touched with impunity, never offering to scratch or bite. This tortoise inhabits the valleys, but is apparently not numerous.

EMYS TRIVITTATA, Duméril and Bibron.

Shell smooth, entire, subcordiform, arched, yellowish green, and with three broad longitudinal black bands ; jaws toothed.

HABIT.—*Malayan Peninsula, Pinang.*

Bengal.

It inhabits rivers and ponds on the Malayan Peninsula, but appears not to be numerous. In the Malayan adult animal there is a large black spot situated at the anterior, lower angle of the marginal shields, there is no trace of a keel in the centre of the vertebral shields, and the very minute nuchal shield is triangular, with the apex towards the vertebral shields. The shield is rather oval than subcordiform. The sternum is slightly arched, of a pale whitish yellow. The largest individual was of the following dimensions :

Length of the head,	0 feet	3 inch.
Ditto ditto neck,	0	$2\frac{4}{8}$
Ditto ditto shell,	1	6
Ditto ditto tail,	0	$2\frac{3}{8}$

GEN. CISTUDO, *Fleming*.

Head moderate, covered with a thin hard continued skin, Toes 5-4, webbed to the claws, web thick, with a small intermediate lobe between the claws. Tail short. Shell convex, ovate, or hemispherical. Sternum broad, rounded before and behind, completely closing the cavity of the thorax, affixed to it by a ligamentous, symphysis, and divided by a cross suture between the pectoral and abdominal plates. Sternal shields twelve. Inguinal and axillary plates very small, but distinct. Marginal plates 23-27. Nuchal plate small or wanting.

CISTUDO AMBOINENSIS, (Daudin.)

SYN.—*Testudo amboinensis*, Daudin.

Emys amboinensis, and *couro*, Schweigger.

Tortue à boîte d' Amboine, Bose.

Terrapene amboinensis, Merrem.

Kinosternon amboinense, Bell.

Cistuda amboinensis, Gray.

Terrapene couro, Fitzinger.

Emys couro, apud Wagler.

Terrapene bicolor. Bell.

Emys couro, Var. Schlegel, apud Gray.

"Baning" of the Malays of the Peninsula.

HABIT.—*Malayan Peninsula, Singapore.*

Java, Amboina, Philippine Islands, Tenasserim provinces.

Shell hemispherical, slightly three-keeled, blackish, margin broad expanded, nuchal shield linear; sternum black and yellow-varied; animal blackish, varied with yellow, head dark with two broad yellow streaks on each side.

The dorsal keels become obsolete with age, and the margin of the shell, particularly the posterior part, becomes revolute. This species appears to be numerous in the valleys, in ponds, rivulets and paddy fields. It is very timid, withdrawing its head and limbs when handled, though it neither bites nor scratches. The largest individual observed was of the following dimensions.

Length of the head,	2 inch.
Ditto ditto neck,	$2\frac{1}{8}$
Ditto ditto shell,	7
Ditto ditto tail,	1

GEN. TETRAONYX, Lesson.

Toes five; nails 4-4; sternum solid, broad with six pairs of shields; 25 marginal shields.

TETRAONYX AFFINIS, N. S.

Young. Shell orbicular, its breadth exceeding its length; the back sharply keeled longitudinally, slightly arched, laterally depressed; costal shields with a tubercular nucleus at the posterior margin; greyish green olive, minutely spotted with brown; edge sharply toothed, pale greenish yellow. Sternum truncated in front, angularly indented behind, narrow, yellow; laterally keeled, compressed, pale yellowish green.

HABIT.—*Sea off Pinang.*

The outline of the shell and its composing shields strikingly resemble the young of *Cyclemys orbiculata*, Bell.*

The nuchal shield (wanting in one individual,) is small, subrectangular or subtriangular, with the base directed backwards. The vertebral shields are strongly keeled, laterally sloping, hexagonal, broader than long, which however with the first is less the case than with the rest; the second, third and fourth are the broadest, and of nearly equal size; the fifth assumes a broadly truncated triangular shape. The costal shields are nearly all as broad as long; the first, second and third have each a tubercular nucleus in the centre of the posterior margin, the fourth is smooth, and a little smaller than the preceding. The first pair of marginal shields is truncated triangular, the second, and third subrectangular; the fourth sixth, and eighth pentagonal; the rest subrectangular. In all, the posterior external angle forms a more or less sharp spine, directed over the anterior external margin of the next shield. From the first to the sixth the shields gradually increase in size, the sixth being the largest and broadest, from which the following gradually decrease towards the twelfth pair, and their angular spines become obsolete. The sternum consists of two parts: one central, and two lateral, formed by the sternocostal processes of the two central pairs, sharply sloping towards the marginal shields. The central part is longitudinally a little concave, narrowing towards both extremities, truncated in front, angularly in-

* SYN. *Emys dentata*. Illust. Ind. Zoolog.—*Emys dhor*, Gray.—*Emys hasseltii*, Boie.—*Emys spengleri*, Var. Schlegel.—*Cistudo diardii*, Dum. and Bibr.

dentated behind. The gular pair of shields is very short, broadly subtriangular with the posterior margin concave, curved backwards. The second, and fifth pairs are of nearly equal size, subquadrangular, their external margins forming a sharp ridge. The central part of the third and fourth pairs is subrectangular, broader than long, their margins forming a sharp ridge where they join the sterno-costal processes. The latter are of nearly equal size, longer than broad, their united length being less than one half of the central part of the sternum. The sixth pair is subrhomboidal, longer than broad. The axillary and inguinal pairs are large; the former subrhomboidal or lozeng-shaped, the latter subtriangular. The head is conic; the muzzle short pointed; the vertex irregularly wrinkled. On the temples, cheeks, and round the orbits, and the lower jaw appear some large polygonal scales. The occiput, angle of the mouth, and the rounded tympanum are covered with similar minute scales. The eyes are large, prominent; the iris silvery grey; the pupil round black. The nostrils are minute, round, horizontally pierced, close together at the apex of the muzzle. The jaws are minutely toothed; the upper has at the symphysis two larger teeth, between which fits a similar single one in the lower jaw, thus hermetically closing the mouth. The neck, the throat and the other soft parts are studded with minute tubercles, except the fore-arm, the posterior tarsal margin, and the back of the fingers and toes, which are covered with broad, but very short, polygonal scales. On the ulnar margin of the fore-arm are four to five large rounded flexible scales. The interdigital web is large and lax. The nails are strong, of nearly equal size, sharp, and arched. The conical tail reaches but little beyond the shell, with a longitudinal furrow behind the vent. The head, neck, throat and the limbs are of the same greyish green olive as the shell. The interdigital membrane is blackish, except the web connecting the fourth and fifth (nailless) toe, which is of a bright greenish yellow colour. Of three individuals observed, differing but little in size, the largest was of the following dimensions:

Length of the head,	$0\frac{6}{8}$ inch.
Ditto ditto neck,	$0\frac{3}{8}$
Ditto ditto shell,	$2\frac{4}{8}$
Ditto ditto tail,	$0\frac{4}{8}$
Greatest transverse diameter of the shell,	$2\frac{6}{8}$

Two were at different times found in fishing stakes placed along the sea-shore of Pinang; a third was also taken out of the sea with a small hook, baited with a shrimp. The Malays assert that this tortoise also inhabits estuaries and rivers on the Peninsula, and that it grows to a considerable size. The young is very timid, withdrawing the head and extremities when touched, and thus it remained immoveable while a sketch was taken.

From the description of the young of *Tetraonyx lessonii*, Dum. and Bibr. given in *Erpétologie Générale*, Tome 2, p. 338, and from the plates of *Emys batagur* and *Emys baska*, in *Illustr. Ind. Zool.*, from B. Hamilton's MSS., the present appears to differ in too many particulars, to warrant the conclusion of its being the young of those or that species.* The detailed description of the young will enable future observers, who may succeed in examining the adult, finally to decide the question.

FAM. POTAMIDA, OR RIVER-TORTOISES, *Dum. and Bibr.*

GEN. GYMNOPUS, *Dum. and Bibr.*

(*Trionyx*, Geoffroy.—*Aspidonectes*, Wagler.—*Tyrse*, *Dogania*, *Chitra*, Gray.)

Shell cartilaginous in its circumference, very broad, flexible behind, and externally not bony; sternum too narrow behind completely to cover the extremities, when the animal withdraws them under the shell.

GYMNOPUS GANGETICUS, (Cuvier.)

SYN.—*Testudo ocellatus*, (Young.) }
Testudo hurum, } Buchan. Ham. MSS.
Testudo chim, (Adult.) }
Trionyx gangeticus, Cuvier.
Trionyx hurum, Gray.
Trionyx hurum, *Illustr. Ind. Zool.*
Trionyx ocellatus, *Illustr. Ind. Zool.* (Young.)
Trionyx gangeticus, Var, Guérin. (Young.)
Gymnopus ocellatus, Dum. and Bibr. (Young.)
Gymnopus duvaucellii, Dum. and Bibr.
Tyrse gangetica, Gray: *Catal.*

Young.—(*Testudo ocellatus*, B. Ham. MSS.) Head above pale olive with one large yellow spot between the eyes and a similar behind

* M. M. Duméril and Bibron describe them as two distinct species; Mr. Gray is of opinion that they are identical.

each eye; neck, limbs and posterior margin of the shell dark olive with paler round spots; shell olive with black irregular lines, and 4 or 5 central ocelli, black in the centre, edged with red, round which a black ring; sternum pale whitish-olive.

Testudo hurum, B. Ham, MSS. is the transition state of the former, being about changing the livery. Head yellow olive, with irregular dark lines; shell light olive, vermiculated with blackish or dark olive. The four ocelli are present, but are altered in colours and shape: the centre, instead of being black, is like the rest of the surface, light olive, vermiculated with black; the red ring is changed to black, and the outer black one to light olive. The shape is changed from round to irregular oval.

Adult. (*Testudo chim*, B. Ham. MSS.) Dark olive-green, vermiculated, and spotted with light olive brown. Beneath greenish white.

HABIT.—*Malayan Peninsula, Pinang (Rivers and Sea-coast.)*

Rivers and Bay of Bengal.

It is of fierce habits, desperately defending itself by biting, emitting when excited a low, hoarse, cackling sound. At Pinang the present species appears to be far less numerous than the two following. The largest individual was of the following dimensions:

Length of the head,	0 feet 4 inch.
Ditto ditto neck,	0 4 $\frac{4}{8}$
Ditto ditto shell,	1 11
Ditto ditto tail,	0 5

GYMNOPUS CARTILAGINEA, (Boddaert.)

SYN.—*Young.*

Testudo cartilaginea, Boddaert.

Testudo boddaertii, Schneider.

Testudo rostrata, Thunberg?

Testudo rostrata, apud Schoepff, and Daudin?

Trionyx stellatus, Geoffroy.

Trionyx stellatus, apud Merrem.

Aspidonectes javanicus, Wagler.

Adult.

Trionyx javanicus, Geoffroy.

Trionyx javanicus, apud Schweigger and Gray.

Gymnopus javanicus, Duméril and Bibron.

Tyrse javanica, Gray: Catal.

Very Young.—Above olive green; the head and upper part of the neck with numerous small white spots, becoming larger and more

distant on the cheeks and chin ; on the vertex, two round black spots ; on the occiput two diverging black lines ; the shell with several large black white-ringed spots, between which numerous smaller indistinct white spots ; margin pale white ; several longitudinal ridges, composed of close minute tubercles. Beneath greenish white.

Older.—Above uniformly olive-green ; the longitudinal ridges of the shell consisting of tubercles, more distant and proportionally smaller than in the very young.

HABIT.—*Malayan Peninsula, Pinang.*

Java, Dukhun, "India," "China."

This species is numerous in rivers and ponds. The largest individual observed was of the following dimensions :

Length of the head,	2 $\frac{1}{8}$ inch.
Ditto ditto neck,	2 $\frac{2}{8}$
Ditto ditto shell,	6 $\frac{3}{8}$
Ditto ditto tail,	0 $\frac{6}{8}$

GYMNOPUS INDICUS, (Gray.)

SYN.—*Testudo chitra*, Buchan. Ham. MSS.

Trionyx indicus, Gray.

Trionyx ægyptiacus, Var. *indica*, Gray : Ill. Ind. Zool.

Gymnopus lineatus, Duméril and Bibron.

Chitra indica, Gray : Catal.

Shell remarkably depressed, smooth.* Above greenish olive, vermiculated and spotted with brown or rust colour ; beneath greenish-white.

HABIT.—*Pinang, Malayan Peninsula, (Estuaries, Sea Coast).*

Rivers in India, Philippine Islands.

At Pinang this species is frequently taken in the fishing stakes. The Chinese inhabitants greatly relish this as well as the preceding species of *Gymnopus*, as articles of food. Individuals weighing 240lbs. occur in the Ganges, and others of gigantic dimensions are not uncommon at Pinang. It is very powerful, and of ferocious habits. The largest individual measured :

* In the living adult no longitudinal central depression is apparent, nor the outline of the costæ, as represented in the figure in *Illustrations of Indian Zoology*.

Length of the head,	0 feet 6 inch.
Ditto ditto neck,	0 5
Ditto ditto shell,	3 1
Ditto ditto tail,	0 4

FAM. THALASSIDÆ, OR TURTLES, *Dum. and Bibr.*GEN. CHELONIA, *Brogniart.*

Body covered with horny plates ; fins with one or two nails.

Sub-Gen. Chelonia liberæ (Chelonées franches). Dum. and Bibr.

Discal shields 13, not imbricate ; muzzle short, rounded ; upper jaw slightly notched in front, toothed on the sides ; lower jaw formed of three pieces, and with the edges deeply toothed ; the first finger of each fin nailed.

CHELONIA VIRGATA, *Schweigger.*

SYN.—Turtle of the Red Sea, *Bruce.*

Chelonia virgata, apud *Cuvier*, *Guerin*, *Duméril* and *Bibron*, *Gray* ; *Catal.*

Chelonia midas, *Var. D. Gray.*

Chelonia fasciata, *Cuvier*, apud *Schlegel.*

“Pinyú” of the Malays of Pinang.

Young.—Head, shell and fins greenish black ; margin of the shell and fins and sternum white.

Adult.—Head and fins chestnut, scales edged with yellow ; shell greenish yellow with chestnut rays and spots ; sternum gamboge, or greenish yellow.

HABIT.—*Malayan Seas.*

Teneriffe, *Rio Janeiro*, *Cape of Good Hope*, *New York*, *Indian Ocean*, *Red Sea.*

This species is at all seasons plentifully taken in fishing stakes in the straits of Malacca, and is the “Green Turtle” of the European inhabitants of our Malayan settlements, and of the sea-ports of India. In size it equals *Chelonia midas*, *Schweigger*, which it rivals in flavour. About December and January is the season when the female deposits her eggs in the sandy beach of some sequestered island, and then the fishermen watch during the moonlight nights to “turn turtles.” The eggs are of a spherical shape, about one inch in diameter, covered by a soft hemitransparent membrane of a pale yellow colour. The expert eye of the fishermen baffles the pains with which the turtle conceals her eggs, and prodigious numbers are disinterred.

They are very rich, flavoured like marrow, and will keep for weeks although exposed to the air.

M. M. Duméril and Bibron have pointed out the differences between the adult of the present species and *Chelonia midas*, Schweigger, principally consisting in colours, and in the form of the vertebral and costal shields, to which may be added the comparative greater length of the fronto-nasal shields in *Chelonia virgata*, in which the breadth is one-third of the length, whereas in *Chelonia midas* it is one-half, and these proportions appear to be constant in all ages of the two species. The very young of both greatly resemble each other in colours and shape. Six living young of the present species were all of the following dimensions :

Length of the head,	0 $\frac{7}{8}$ inch.
Ditto ditto neck,	0 $\frac{4}{8}$
Ditto ditto shell,	2
Ditto ditto tail, ..	0 $\frac{2}{8}$

The following slight differences are the result of a comparison between the living young of *Chelonia virgata* and the representation of *Chelonia midas* given by Schoepff. Tab. XVII. Fig. 2.

Chelonia virgata.

1. Shell cordiform; the length exceeds the breadth by one-eighth.
2. 2d vertebral shield much broader than 1st, and is altogether the largest of the series.
3. 2d costal shield larger than the 3d.
4. Sincipital plate broader than long.
5. Breadth of fronto-nasal shields one third of their length.
6. Each fin with a single nail.

Chelonia midas.

1. Shell ovate; the length exceeds the breadth by more than two-eighths.
2. 1st and 2nd vertebral of equal dimensions.
3. 2d and 3d costal equal.
4. Sincipital plate longer than broad.
5. Breadth of fronto-nasals one half of their length.
6. Each fin with 2 nails.

Sub. Gen. Chelonix imbricatae, (*Chélonées imbriquées*,) Dum. and Bibr.

Discal shields 13, imbricate; muzzle long, compressed; jaws with the edge straight, not toothed, at the extremity slightly recurved; each fin with 2 nails.

CHELONIA IMBRICATA, (Linné.)

SYN.—La Tortue Caret, Dutertre.

Scaled Tortoise, Grew.

Caret, Labat, Fermin, Lacép., Bosc, Cuvier.

Testudo marina americana, Seba.

Hawksbill Turtle, Brown, Catesby.

Testudo imbricata, Linné, apud	{	Gmelin.
		Pennant.
		Donnd.
		Schoepff.
		Latreille.
		Schneider.
		Shaw.
	{	Daudin.

Testudo caretta, Knorr.

La Tuilée, Daubenton.

Caretta imbricata, Merrem, apud Gray : Catal.

Chelonia multiscutala, Kuhl?

Chelonia imbricata, Schweig-	{	Prince Maxim.
ger, apud.		Gray.
		Duméril and Bibron.
		Prince Musignano.
		Bell.

Chélonée faux caret, Lesson.

Chelonia caretta, Temminck, and Schlegel.

"Kúra-kúra" of the Malays of Pinang.

Head brown, scales edged or rayed with yellow ; shell yellow, marbled or rayed with rich brown ; sternum yellowish white. In the young the areola of the sternal shields black.

HABIT.—*Malayan Seas.*

Atlantic and Indian Ocean.

The largest individual observed was of the following dimensions :

Length of the head,	0 feet $4\frac{4}{8}$ inch.
Ditto ditto neck,	0 $3\frac{4}{8}$
Ditto ditto shell,	1 7
Ditto ditto tail,	0 $2\frac{2}{8}$

Sub. Gen. Caouanæ, (Caouanes,) Dum. and Bibr.

Discal shields 15, not imbricate ; jaws at the extremity slightly recurved.

CHELONIA OLIVACEA, Eschscholtz : Atlas.

SYN.—Chelonia caouana, Var. B. Gray.

Chelonia dussumierii, Dum. and Bibr.

Caouana olivacea, Gray : Catal.

Young.—Above blackish olive, lighter than in the adult; shell and fins edged with pale yellow; sternum pale greenish yellow, washed with chestnut, areolæ blackish.

Adult.—Head brown; shell blackish green; some of the marginal scales of the fins yellow; sternum yellow, washed with chestnut; 27 marginal shields; fins with one nail.

HABIT.—*Malayan Seas.*

Bay of Bengal, Chinese Seas.

This species is at Pinang of rare occurrence. A single young individual observed was of the following dimensions:

Length of the head,	$1\frac{7}{8}$ inch.
Ditto ditto neck,	1
Ditto ditto shell,	6
Ditto ditto tail,	$0\frac{7}{8}$

The shell is broad sub-cordiform, (its length exceeding its breadth by half an inch,) three-keeled, the vertebral keel strongest, dentated behind; the marginal shields 27, obliquely placed. The 1st and 4th pair of costals, and the 4th vertebral shield each divided in two pieces.

In a not quite full-grown specimen, in the Museum of the Asiatic Society, the length of the shell is 2ft. $1\frac{4}{8}$ inch; its greatest breadth is 2ft. $0\frac{4}{8}$ inch, the length exceeding the breadth by one inch. The vertebral shields are still slightly keeled. The 1st and 4th pair of costals, the 2nd left costal, and the 4th vertebral are divided. The central part of the margin is slightly curved upwards. The edges of the jaws are not toothed, but they are transparent with fine white vertical lines, which give them a fringed appearance.

The flesh of this turtle, though relished by the Chinese settlers, is unpalatable to Europeans.

SAURIA.

FAM. CROCODILIDÆ, *Bonaparte* (ASPIDIOTES, *Dum. and Bibr.*)*Sub. Gen Crocodilus, apud Cuvier.*

Muzzle oblong, depressed ; teeth unequal, the 4th of the lower jaw fitting into lateral notches, and not into hollows of the upper jaw. Skull behind the eyes with two large holes, perceptible through the integuments. Hind-feet with an external dentated crest, and the toes palmated.

CROCODILUS VULGARIS, *Cuvier*.—VAR. B., *Dum. and Bibr.*SYN.—*Crocodilus palustris*, *Lesson*.*Crocodilus vulgaris*, Var. E. *Gray*.*Crocodilus biporcatus raninus*, *Müller*, Tab. 3, Fig. 7.*Crocodilus palustris*, *apud Gray* : *Catal*.

“Buaya” of the Malays.

Muzzle a little widened, thick, transversally very slightly curved ; head covered with angular rugosities ; lateral margins of the skull not raised. Above greenish-olive, speckled with black ; beneath yellowish or greenish-white.

HABIT.—*Malayan Peninsula and Islands.*

Java, Sumatra, Tenasserim, Bengal, Coromandel, Malabar.

It inhabits not only rivers and estuaries, but also the sea-coasts, and may in calm weather be seen floating at a distance of two to three miles from the shore. Although numerous at Pinang and the opposite coast, it appears to be less so than *Crocodilus biporcatus*. Fishermen while working the nets are not seldom attacked by Crocodiles, and would, but for their presence of mind, oftener than they do, forfeit their lives. When seized, they force the fingers into the eyes of the Crocodile, which immediately lets go its victim, who is farther rescued by his comrades.—From 1842 to 1845 amputations from accidents of this description, were unfortunately of no rare occurrence in the General Hospital at Pinang.

Individuals, 15 feet in length are not uncommon ; some attaining to 20 feet and upwards are reported to occur.—In rivers a single one will often appropriate to himself a limited district, which if it happens to be in the vicinity of a village, will soon be perceived in the loss of the grazing cattle. Instances of Malays, who, to avenge the loss of a relative, have watched the crocodile, and by diving from below, plunged a Kris into its

heart, are on record. The eggs are white, the shell hard, of a cylindrical form, upwards of 3 inches in length, and about $1\frac{1}{2}$ inch in diameter.

CROCODILUS POROSUS, Schneider.

SYN.—*Crocodili Ceylonici ex ovo prodiens*, Seba.

Cr. biporcatus, Cuvier, apud	{	Tideman, Oppel, Liboschitz.
		Merren.
		Bory de St. Vincent.
		Fitzinger.
		Lesson.
		Guerin.
		Wagler.
		Gray.

Crocodilus biporcatus raninus, Müller, Tab. 3, Fig. 8.

Crocodilus porosus, Schn., apud Gray : Catal.

"Buaya" of the Malays.

Upper jaw surmounted by two rugged ridges, each commencing from the anterior angle of the eye ; nuchal plates either none, or two very small. Above yellowish green with large black oval spots ; keels of the dorsal scales green ; beneath greenish white.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

India, Tenasserim, Sumatra, Java, Timor, Seychelle Islands.

This, in the Malayan countries exceedingly numerous species, is of the same habits, and attains to the same size as the preceding.

FAM. GECKONIDÆ, Bonaparte (ASCALABOTES, Dum. and Bibr.)

GEN. PLATYDACTYLUS, Cuvier.

Toes more or less dilated throughout their length, beneath with transverse imbricate plates, either entire or divided by a central longitudinal groove.

PLATYDACTYLUS LUGUBRIS, Dum. and Bibr.

SYN.—*Amydosaurus lugubris*, Gray.

Thumbs nailless ; transverse plates beneath all the toes ; back finely granular. Above whitish, with black spots.

HABIT.—*Pinang.*

Otaheite.

A single male was captured in my house in the valley of Pinang. The integuments correspond to the description given by M. M. Duméril and Bibron, to which may be added the following characters :

The skin is somewhat loose, forming a slight longitudinal fold on each side of the body, and on the anterior margin of the thigh. The anus is covered by a transversal fold, reaching across from the one thigh to the other. There are no femoral pores. The tail is tapering, much depressed, convex on the upper surface, flat beneath, sharp at the sides. Near the root, about $\frac{2}{8}$ of an inch distant from the anus, the skin forms an annular fold, completely encircling that part of the tail. The colour slightly differs from that of the Otaheite individuals. The upper parts and the lower surface of the tail from the annular fold are of a buff or pale dust colour, so closely and minutely dotted with reddish brown, that the parts have a pale greyish brown appearance. On the loins and between the shoulders are a few distant blackish spots, besides in the latter place appear two short lateral lines, and an indistinct band proceeds from the nostril across the eye to the shoulder. The throat, inner side of the limbs, abdomen and the lower surface of the root of the tail to the annular fold are buff-coloured. The pupil is black, vertical, dentilated, the iris silvery, dotted with reddish brown.

Length of the head $0\frac{4}{8}$ inch.

Ditto ditto trunk $1\frac{2}{8}$

Ditto ditto tail $1\frac{3}{8}$

Entire length $3\frac{1}{8}$ inch.

PLATYDACTYLUS GECKO, (Linné.)

SYN.—*Salamandra indica*, Bontius.

Gekko ceilonicus, Seba.

Lacerta cauda tereti mediocri, Linné mus. Adolph.

Lacerta gekko, Linné.

Gekko teres, } Laurenti.

Gekko verticillatus, }

Salamandre, ou *Gecko* de Linneus, Knorr.

Stellio gekko, Schneider

Common *Gecko*, Shaw.

Gekko guttatus, Daudin, apud Gray.

Lacerta guttata, Hermann.

Gecko verus, Merrem, apud { Gray. Zool. Journ.

{ Gray. Catal.

Gecko annulatus, Kuhl

Gecko à gouttelettes, Cuvier

Platydactylus guttatus, Cuv. apud Guerin, Dum. and Bibr.

"Toké" of the Malays.*

* The Malays denominate the family of *Gekkotidae*: *Gékko*, *Kéko*, *Gágo*, *Goké*, evidently Onomatopocias, in imitation of the cry of these lizards.

Above ash-coloured with numerous pale orange spots ; beneath yellowish white. Between the scales of the back 12 longitudinal rows of large distant tubercles, and six similar on the tail ; the latter with minute scales beneath.

HABIT.—*Malayan Peninsula.*

Philippine Islands,

Java, Tenasserim, Burmah, Bengal, Coromandel Coast.

On the Malayan peninsula this species appears to be less numerous than in the Tenasserim Provinces, where its shrill cry, "To-ke" is nightly heard in houses. The male has two tubercular scales on each side of the root of the tail. The largest individual observed was of the following dimensions :

Length of the head,	$1\frac{7}{8}$ inch.
Ditto ditto trunk,	$4\frac{2}{8}$
Ditto ditto tail,	$4\frac{5}{8}$
Entire length	$10\frac{6}{8}$ inch.

PLATYDACTYLUS STENTOR. N. S.

SYN.—"Toké" of the Malays.

Above light bluish grey with numerous irregular blackish spots, forming on the vertex an angle like an inverted V., and on the neck short oblique lateral bands. Beneath pearl-coloured. On the back and sides 10 longitudinal rows of large distant lenticular scales, and 6 similar on the tail ; the latter with scutella beneath.

HABIT.—*Pinang.*

In form and size this species closely resembles the preceding, from which it however differs in the following particulars. The oval nostrils are bordered in front by three scales, viz. the first upper-labial, a smaller rectangular, and a larger pentagonal scale, both of which latter are situated between the nostril and the rostral. Above the nostrils are surrounded by two smaller irregular triangular, and behind by a narrow crescent-shaped scale. Of labial scales there are 14 above, 12 below. There are about 72 teeth in each jaw. The eye is very large ; pupil black dentilated ; iris silvery bluish grey. The ear is very large, ob-

liquely oval without dentilations. The cheeks are much swollen. The scales of the back are small, rounded, hexagonal, becoming more rectangular on the sides. The rows of lenticular scales along the vertebræ are smaller than the rest, but not so close as in *P. guttatus*. Behind the mental scale is a pair of large elongated scales, and 5 pentagonal larger appear on each side behind the lower labials. The gular scales are small, polygonal; the abdominal are rounded, hexagonal, not imbricate, and below the root of the tail become somewhat larger. The rest of the lower surface of the tail is covered with scutella. Above the covering of the tail is like that of *P. guttatus*. On each side of the posterior margin of the cloaca are two very large tubercular scales, and towards the centre two rather large postanal pores, covered by a loose fold of the skin. Fourteen femoral pores are placed on a slightly angular line. This species is also closely allied to *Platydictylus monarchus*, Schlegel, from which it however readily may be distinguished by the regular rows of lenticular dorsal scales, by its far greater size, and by its loud note. It is not numerous at Pinang. The only individual obtained, from the villa on the Pentland Hills, was a male of the following dimensions :

Length of the head,.....	$2\frac{3}{8}$ inch.
Ditto ditto trunk,	$5\frac{4}{8}$
Ditto ditto tail,	$8\frac{2}{8}$
Entire length	1 ft. 4 inch.

PLATYDICTYLUS MONARCHUS, Schlegel, MS.

SYN.—*Platydictylus monarchus*, Schl. apud Dum. and Bibr.

Gecko monarchus, Gray: Catal.

On the back, sides and limbs numerous conical tubercles irregularly scattered among the smaller flat polygonal scales; on the upper surface of the tail 6 to 13 transversal series of small spines; beneath scutella, sometimes mixed with scuta. Chin with 2 larger oblong scales.

New-born.—Above brown, with the dorsal and caudal tubercles (no spines) white; the posterior part of the tail indistinctly white ringed; beneath uniformly paler brown.

Adult.—Above buff or ash-coloured or reddish brown, with 8 to 12 pairs of irregularly rounded, distant, dark brown spots along the spine;

the head, limbs and sides with numerous more or less distinct, irregular dark brown spots; in some younger individuals the tail with whitish rings. Beneath yellowish white.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

Philippine Islands, Amboyna, Borneo.

The Malayan *Geckonidæ* have the power of somewhat changing the ground colour, none however in a greater degree than the present species. In the valley and on the hills of Pinang it is very numerous, swarming at night in rooms, on the walls, and under the ceiling, occasionally giving out a sound, resembling the monosyllable "Tok," repeated 6 or 8 times with increased celerity. The aim of these lizards is by no means unerring; they frequently miss an insect, and fall from the ceiling. Among themselves they are pugnacious: when two or more covet an insect, the successful one has to defend its prize, or give it up to the stronger. The new-born (with umbilical aperture) and adult are of the following dimensions:

	<i>New-born.</i>	<i>Adult.</i>
Length of the head,	$0\frac{3}{8}$	$1\frac{2}{8}$ inch.
„ „ trunk,	$0\frac{5}{8}$	$2\frac{2}{8}$
„ „ tail,	$1\frac{1}{8}$	$3\frac{1}{8}$
Entire length,	$2\frac{1}{8}$	$6\frac{5}{8}$ inch.

Sub-Gen. Ptychozoon, Kuhl.

Toes webbed to the last compressed joint; thumbs nailless; sides of the head, body, limbs and tail with broad scaly membranes, those of the tail anteriorly scalloped. Male with femoral pores. On the sides scattered tubercles.

PTYCHOZOOM HOMALOCEPHALUM, (Creveld.)

SYN.—*Lacerta homalocephala*, Creveld.

Gecko homalocephalus, Tilesius.

Ptychozoon homalocephalum, apud { *Fitzinger.*
Wagler.
Wiegmann.

Pteropleura horsfieldii, Gray.

Platydaetylus homalocephalus, Cuv. apud Dum. and Bibr.

Ptychozoon homalocephala, Kuhl. apud Gray: Catal.

Head. The ground colour yellowish green olive. Between the eyes and muzzle a double figure, in whitish outline, representing in front a

broad arrowhead, posteriorly united by a narrow stalk to a rectangular transversal band, situated in front of the eyes. On the vertex another, larger figure, traced in whitish outline, rectangular in front, spreading like a four-rayed star over the occiput. A dark brown band proceeds from behind the eye, across the ear, to the shoulders, where it is lost in the general dark brown colour of the sides of the body. The superior margins of these two lateral bands are white proceeding backwards in zig-zag line, approaching each other over the shoulders, where they join the anterior black transversal line. The lips white. The membranes of the cheeks pale flesh-colour, with dark blue spots, and with the interstices between the scales pale lilac. The pupil vertical, denticulated; the iris rich golden brown.

Back. Of the same ground colour as the head, becoming dark reddish brown on the sides, relieved by 4 to 6 distant transversal black dotted lines, on the upper part of the form of the letter M, sending oblique, forwards pointed, lines on the sides. The upper part of the lateral membrane reddish brown; the interstices of the small rectangular scales purple.

Tail and limbs. Same ground-colour, as that of the head and back, with broad, distant, indistinctly whitish, transversal bands. On each elbow a whitish ring. Membranes of the tail, limbs and toes are yellowish grey with numerous minute spots of brown, purple, blue and red, which impart a purple, changing appearance to the general colour. The number of the indentations of the caudal membranes varies individually; the posterior part is entire, with waving surfaces.

Lower parts. Brownish white, with a few pale brown spots on the throat, innerside of the limbs, in the palms and soles. The tail and its membranes brownish.

HABIT.—*Pinang Hills.*

Singapore, Java, Ramree Island, (Arracan.)

As correctly observed by M. M. Duméril and Bibron, the scales of the female, corresponding to those with the femoral pores of the male, have a slight, yet distinct, central depression. The female has a large tubercular scale on each side of the root of the tail, as well as the male. In colour and size the two sexes resemble each other. Two individuals were at different times captured in the villa occupied by Sir William Norris on the Great Hill of Pinang. When the lizard

is at rest, the membranes of the cheeks, and the body are kept in close contact with these parts; in leaping those of the body are somewhat stretched out, and all the membranes together then act as a parachute. Also this lizard has in some degree the power of changing the ground colour from a darker to a lighter shade. The apex of the tongue is rounded, with a small notch in the centre. A female while in my possession refused insects and water. She deposited a single egg, of a spherical form, about half an inch in diameter, soft, and of a yellowish white colour, which the following day she devoured. A male ate the integuments he had been changing. The female was of the following dimensions :

Length of the head, 1 inch.

Ditto ditto trunk, $2\frac{6}{8}$

Ditto ditto tail, $3\frac{5}{8}$

Entire length, $7\frac{3}{8}$ inches.

In the Museum of the Asiatic Society is preserved a specimen of *Leptophis ornatus*, (Merrem,) in the act of devouring one of the present species. The serpent was captured in the island of Ramree on the coast of Arracan.

GEN. HEMIDACTYLUS, Cuvier.

End of the toes widened into an oval disk, with a double series of transverse, imbricate plates beneath. From the middle of the disk rise the slender second and third nailed phalanx. A series of scuta beneath the tail.

HEMIDACTYLUS PERONII, Dum. and Bibr.

SYN.—*Hemidactylus leiurus*, Gray.

Peripia peronii, Gray : Catal.

Under the chin a large triangular figure, composed of six elongated, towards the sides decreasing, scales; thumbs nailless; male with femoral pores; tail much depressed, very broad at the root, tapering towards the point, (sometimes with a small membrane on each side of the point,) with a series of scuta beneath; pupil vertical, shaped like two rhombs placed with the angles towards each other.*

* Such is its appearance in the living animal, when the eye is exposed to the influence of light. M. M. Duméril and Bibron note the pupil being "elliptical," which probably originates in their describing from preserved specimens, although my own in spirits of wine have retained the original form of the pupil.

Above ash-coloured, labial scales whitish, each with a brown spot ; beneath whitish. Iris silvery grey, spotted with brown.

HABIT.—*Pinang*.

Isle of France.

Of two individuals, captured at different times in my house in the valley of Pinang, the larger was of the following dimensions :

Length of the head,	$0\frac{6}{8}$ inch.
Ditto ditto trunk,	$1\frac{5}{8}$
Ditto ditto tail,	$2\frac{3}{8}$

Entire length, $4\frac{6}{8}$ inches.

HEMIDACTYLUS COCTÆI, Dum. and Bibr.

Thumbs well developed, nailed ;* back with minute granular scales ; in some individuals with a few larger ones on the sides ; tail broad at the root, tapering, a little depressed, with from 4 to 15 indistinct rings and 6 series of minute spines ; beneath with scuta ; chin with 4 larger scales ; the central pair elongate pentagonal ; male with 12 femoral pores ; pupil as in *Hemidactylus peronii*.

Above ash-coloured, whitish beneath.

HABIT.—*Pinang*.

Bengal, Bombay.

Of two males observed in houses in the valley of Pinang, the larger was of the following dimensions :

Length of the head,	$1\frac{2}{8}$ inch.
Ditto ditto trunk,	$2\frac{4}{8}$
Ditto ditto tail,	$3\frac{2}{8}$

Entire length, 7 inches.

HEMIDACTYLUS FRENATUS, Schlegel, MS.

SYN.—*Hemidactylus frenatus*, Schlegel, apud Dum. and Bibr.

Hemidactylus lateralis,
Hemidactylus quinquelineatus, } Gray : B. M.

Back with some larger granular scales ; tail rounded, tapering above, with 6 series of small spines, scuta beneath ; chin with 4 or 6 larger

* Mr. Gray gives the present species as a Syn. of *Boltalia sublævis*, Gray, (Catalogue, p. 158.) As the latter species is characterised as having the thumbs "clawless," it cannot be identical with *H. coctæi*.

scales ; ears very small ; pupil as in the preceding species ; thumbs very small, femoral pores 26 to 28, disposed on a slightly angular line.

Young and Adult.—Buff or ash-coloured, with or without brown spots ; some with one or two brown lateral bands, commencing one above the other from the muzzle, interrupted or continued to the tail ; the latter in some with indistinct brown rings. Beneath whitish or buff.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

Amboyna, Timor, Java, Marianne Islands, Ceylon, Bengal Assam,* South Africa, Madagascar.

In the Malayan valleys and hills this small species is very numerous. It is of fierce habits, like several other *Geckonidae*, destroying its own species. Its normal colour appears to be greyish, which it however has in its power to change. The largest individuals observed were of the following dimensions :

Length of the head,	0 $\frac{5}{8}$ inch.
Ditto ditto trunk,	2
Ditto ditto tail,	2
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Entire length, 4 $\frac{5}{8}$ inches.	

HEMIDACTYLUS PLATYURUS, (Schneider.)

SYN.—*Stellio platyurus*, Schneider.

Lacerta schneideriana, Shaw.

Gecko platyurus, Merrem.

Hemidactylus platyurus, Wiegmann.

Hemidactylus marginatus, Cuvier, apud $\left\{ \begin{array}{l} \text{Wagler.} \\ \text{Wiegmann.} \\ \text{Gray.} \end{array} \right.$

Platyurus schneiderianus, Gray : Catal.

Sides of the body and posterior margin of the thighs with a loose membrane ; tail tapering, depressed, with sharp, fringed margins, with scuta beneath ; toes webbed half their length ; chin with 4 pentagonal broad scales, placed in pairs, behind each other : 6 femoral pores placed on a continued line.

Young and Adult.—Above ash-coloured, in some with a greyish brown lateral band, from the muzzle continued to the tail ; the latter with indistinct brownish transversal bands ; others irregularly spotted and

* Specimens in the Museum of the Asiatic Society.

marbled with blackish brown; pupil and iris as in the preceding species. Whitish beneath.

HABIT.—*Pinang*.

Philippine Islands, Borneo, Java, Bengal, Assam.*

The individuals were observed in houses in the valley of Pinang. In a male the posterior half of the tail happens to be divided so as to appear double; one of the pieces, the continuation of the normal tail, is depressed, slightly fringed, and beneath with the row of scuta continued, the other is cylindrical, somewhat shorter, and above and below covered with minute scales. The largest individual was of the following dimensions:

Length of the head,	$0\frac{5}{8}$ inch.
Ditto ditto trunk,	2
Ditto ditto tail,	$2\frac{1}{8}$
<hr/>	
Entire length,	$4\frac{6}{8}$ inches.

GEN. GYMNOACTYLUS, *Spix*.

Toes not widened into a disk, nor with dentilated margins; all five with non-retractile nails; fifth hind-toe versatile or capable of turning from the others under a right angle.

GYMNOACTYLUS PULCHELLUS, (Gray.)

SYN.—*Cyrtodactylus pulchellus*, Gray.

Gonyodactylus pulchellus, Wagler.

Gymnodactylus pulchellus, Duméril and Bibron.

Head, back and limbs with numerous three-sided tubercles among the smaller flat scales; sides of the body with a longitudinal fold of the skin; the anterior upper part of the cylindrical tail with distant rings of rounded, pointed tubercles; beneath a row of scuta. Chin with six scales, the centre pair elongated pentagonal. Males with 36 femoral pores on two not connected lines, between which, in front of the anus, a short narrow, longitudinal furrow. Both sexes with 3 or 4 tubercles obliquely situated on each side of the root of the tail.

Young and Adult.—Above a rich brownish ochre; the nape of the neck and back with 6 broad transversal bands (the two anterior horse-shoe shaped), of a rich velvety mulberry, or snuff-colour with sulphur

* Specimens in the Museum of the Asiatic Society.

or chrome-yellow margins. The tail with 8 or 9 complete rings of similar colour, without the margins. Beneath : throat and belly whitish yellow, or pale brownish, each scale minutely dotted with brown. Pupil vertical, dentilated ; iris golden, finely vermiculated with Van Dyke brown.

HABIT.—*Pinang Hills.*

Singapore.

In the male the two rows of femoral pores commence as two short parallel longitudinal lines, separated from each other by a narrow short furrow, on the sides of which, (vertically,) the first 5 femoral (preanal), pores are placed. In front of the anus the short vertical portions turn right and left under a nearly right angle, continuing the entire length of the thigh, each supporting 13 more femoral pores. The interval between the anus and the latter is partly occupied by a flat, slightly raised triangular space, covered by rather large, imbricate, rounded scales. In the female the two lines of larger scales carrying the femoral pores of the males, are present, each scale having a small shallow, round depression. The short, longitudinal furrow of the male is either wanting or barely distinguishable, but the triangular space with larger scales, in front of the anus, is present. The species appears to be rather numerous on the hills at Pinang, where the individuals obtained were captured in houses, at an elevation of 2,200 feet. The largest male was of the following dimensions :

Length of the head,	1 $\frac{4}{8}$ inch.
Ditto ditto trunk,	3
Ditto ditto tail,	5 $\frac{4}{8}$

Entire length, 10 inches.

Its habits offer nothing peculiar : it bites fiercely in defence. In captivity it refuses insects. The integuments, when about being renewed, are piecemeal torn off by the teeth, and devoured. A single egg deposited was of a spherical form, about half an inch in diameter, of a whitish yellow colour. M. M. Duméril and Bibron assign Bengal as the Habitat of this species. The specimen originally described by Mr. Gray, some in the Museum of the Asiatic Society, and a number in my own collection, all are from the hills of Prince of Wales Island (Pulo

Pinang,) but no authenticated record exists of this species ever having been observed in Bengal. Another, widely different species of *Gymnodactylus* inhabits Bengal, as yet not published, and only known from three specimens, preserved in spirits in the Museum of the Asiatic Society, where they are marked *Gymnodactylus lunatus*, Blyth. One of these came from Midnapore, the others from Chyebassa. The species somewhat approaches to *G. fasciatus*, Dum. and Bibr. (*Cubina fasciata*, Gray.) The Museum possesses another nondescript species from Almorah, *Gymnodactylus nebulosus*, Blyth, MSS. allied to *G. marmoratus*, (Gray).

The plate of *Cyrtodactylus pulchellus* in Gray's Illustrations of Indian Zoology is not taken from life, and gives a most inadequate idea of the physiognomy and beauty of the living animal. This should be observed, as M. M. Duméril and Bibron praise the figure, which evidently has served as original of their own description, and of copies introduced in illustrative works upon that order of animals.

FAM. VARANIDÆ, Bonaparte, (PLATYNOTES, Dum. and Bibr.)

GEN. VARANUS,—Merrem.

Scales set side by side, surrounded by an annular series of very minute tubercles; tail above more or less trenchant; on the throat a fold in front of the chest.

Varani aquatici,—Dum. and Bibr.

VARANUS NEBULOSUS,—Duméril and Bibron.

SYN.—Tupinambis nebulosus, Cuvier MSS.

Monitor nebulosus, Gray.

Monitor nebulatus, Schlegel.

Uranus nebulosus, apud Gray: Catal.

Muzzle very elongated; nostrils obliquely cleft, situated half-ways between the muzzle and the anterior angle of the eye; lips each with 50 scales; teeth compressed with sharp but not dentilated edges.

Young.—Above. Ground-colour deep chocolate brown; the head largely marbled with greenish yellow; neck with indistinct obliquely converging gamboge lines; back, sides and limbs with gamboge spots, consisting of one to five scales, (those of the upper margins of the fingers forming continued lines;) sides of the anterior half of the tail, similarly coloured; the double row of scales covering the back of the tail gamboge,

the posterior half deep chocolate with two distant, (the second subterminal,) indistinct gamboge coloured rings.

Beneath. Ground-colour pale chocolate. Chin, throat, chest and forelimbs transversely undulated with greenish yellow; abdomen with short, interrupted, transversal yellow bands, consisting of from 4 to 12 scales; hind-limbs with larger similar spots; anterior half of the tail indistinctly marbled with yellowish green; posterior half like the upper surface. Pupil round; iris narrow golden.

Adult.—Above brownish olive with yellow dots; anterior half of the tail yellow with minute square brown spots; posterior half brown and yellow-ringed; margins of the toes yellow. Beneath marbled and barred with brown and yellow.

HABIT.—*Pinang*.

Java, Siam, Bengal.

The only individual observed was a young male, captured in the hills at Pinang, of the following dimensions:

Length of the head,	1 $\frac{5}{8}$ inch.
Ditto ditto trunk,	5 $\frac{2}{8}$
Ditto ditto tail,	9 $\frac{1}{8}$

Entire length, 16 inches.

VARANUS FLAVESCENS, (Gray).

SYN.—*Monitor flavescens*, Gray.

Monitor hardwickii, Gray, MSS.

Varanus russellii, Schlegel, MSS.

Monitor exanthematicus, Var *indica*, Schlegel.

Varanus picquotii, Dum and Bibr.

Empagusia flavescens, Gray: Catal.

Muzzle obtuse; nostrils oval, oblique, nearer the muzzle than the orbit; a series of supraorbital scales larger than the rest; scales of the back distant, bluntly keeled, of the tail and outside of the hind-limbs closer, sharply keeled; toes very short, nails yellow.

Above. Ground-colour light green-olive with numerous distant, interrupted, transversal, yellow bands; temples, cheeks and lips yellow. Beneath yellow; the throat with transversal pale brownish bands.

HABIT.—*Pinang*.

Bengal, Nipal.

A single male observed was of the following dimensions:

Length of the head,	0 feet 3 inch.
Ditto ditto trunk,	1 0 $\frac{5}{8}$
Ditto ditto tail,	1 6 $\frac{1}{8}$
Entire length,	2 feet 9 $\frac{6}{8}$ inch.

VARANUS SALVATOR. (Laurenti).

SYN.—*Lacertus indicus*, Lochner ?

Lacerta mexicana, Seba.

Lacertus americanus, *amphibius* *Tupinambis dictus* : Seba.

Stellio salvator, Laurenti.

Monitor Lizard, Shaw.

Lacerta monitor ? Hermann.

Tupinambis bivittatus, Kuhl, apud Boie.

Monitor elegans, Gray.

Monitor à deux rubans, Cuvier.

Hydrosaurus bivittatus, Wagler.

Monitor vittatus, Lesson.

Varanus bivittatus, Duméril and Bibron.

Hydrosaurus salvator, Gray : Catal.

“Beyáwak” of the Malays of the Peninsula.

Head very elongated ; nostrils oval, nearly transversal, close to the muzzle ; a series of supraorbital scales, larger than the rest ; teeth with dentilated edges ; toes very long. Above. Ground colour dark brown or black ; a band on the side of the neck from the shoulder to the eye, 5 to 7 distant, transversal series of separate rings, between which numerous spots or interrupted transversal lines, all yellow or yellowish white ; the outside of the limbs and the tail spotted, the latter indistinctly banded with yellow. Beneath yellow, the throat with indistinct transversal black bands and minute spots ; the sides of the body and limbs in some individuals with large blackish dentilations.

HABIT.—*Malāyan Peninsula, Pinang.*

Philippine and Molucca Islands, Amboina, Java, Bengal.

This species is very numerous both in hilly and marshy localities. It is commonly during the day observed in the branches of trees overhanging rivers, preying upon birds and their eggs, and smaller lizards, and when disturbed, it throws itself from a considerable height into the water. When attacked on level ground, it attempts its escape by running, if possible towards the water. Its quickness however is not so great as to prevent a man from overtaking it, when it will courageously defend itself with teeth and claws and by strokes of the tail. The

lowest casts of Hindoos capture these lizards commonly by digging them out of their burrows on the banks of rivers, for the sake of their flesh, which by these people is greatly relished.—Some individuals attain to nearly 7 feet in length, but the majority are smaller. A female examined was of the following dimensions :

Length of the head,	0 feet $4\frac{4}{8}$ inch.
Ditto ditto trunk,	1 $3\frac{4}{8}$
Ditto ditto tail,	2 $8\frac{4}{8}$

Entire length, 4 feet $4\frac{4}{8}$ inch.

FAM. IGUANIDÆ, Gray, (EUNOTES, *Duméril and Bibron.*)

SUB-FAM. ACRODONTINÆ (ACRODONTES, Dum. and Bibr.)

GEN. CALOTES, *Cuvier.*

Head quadrangular pyramidal, more or less elongated, with small angular scales of nearly equal diameter. Occipital scale minute. Tongue thick, fungous, rounded, with the apex slightly notched. In the upper-jaw 5 incisors and 2 canines. Nostrils lateral, pierced through a plate situated close to the muzzle. No transversal fold on the throat, sometimes with a large longitudinal fold on both sides. A gular pouch varying in size. A crest from the nape of the neck to the tail. Scales of the sides of the trunk homogeneous, imbricated in oblique series. No femoral pores.

SUB.-GEN. BRONCHOCELA, *Kaup.*

Scales of the trunk in oblique series, inclined backwards, their points directed downwards. Posterior part of the sides of the head not swollen.

BRONCHOCELA CRISTATELLA, (Kuhl.)

SYN.—*Lacerta mexicana strumosa*, &c. Seba, 89, 1.

Agama cristatella, Kuhl.

Agama gutturosa, Merrem.

Bronchocela cristatella, Kaup, apud Dum. and Bibr.

Agama moluccana, Lesson, apud Schinz.

Calotes gutturosa, Guérin.

Calotes cristatellus, Schinz.

Calotes gutturosus, Wiegmann.

"Grúning" of the Malays of the Peninsula.

Cervical crest (6 to 10 scales,) abruptly decreasing on the anterior part of the back; scales of the side of the trunk keeled, scarcely half the size of those of abdomen; behind the posterior angle of the orbit

3 to 5 flattened scales, pointing outwards, forming a minute longitudinal crest.

Normal colours. Beautiful grass green, lighter beneath, entirely, or partially changeable to light grey, greyish olive, greenish brown, or blackish, sometimes with orange spots, or with indistinct black network; large isolated round spots on the head or back, or the lips, eyelids, or margins round tympanum, momentarily black; sometimes with transversal distant brown bands, particularly on the tail.* Scales of the outside of the limbs and feet edged with brown. Pupil circular; iris brown with a narrow golden ring.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

Amboyna, Island of Buru, Java, Sumatra.

This species is very numerous in the Malayan countries both in the vallies and on the hills. It moves and leaps with great quickness among the branches of trees. The most striking feature is the great power of suddenly changing its colours. The Malayan denomination of this species is "*Gruning*," which in Marsden's Dictionary is translated "a species of lizard, which changes its colour as it is affected by fear or anger; the *cameleon*." No *cameleon* however appears to inhabit the Malayan countries, but the present lizard passes under that name among the European inhabitants. One of the largest males was of the following dimensions:

Length of the head,	0 feet $1\frac{3}{8}$ inch.
Ditto ditto trunk,	0 $3\frac{6}{8}$
Ditto ditto tail,	1 $2\frac{6}{8}$

Entire length, 1ft. $7\frac{7}{8}$ inch.

Those of the intestinal canal:

Small intestines,	$3\frac{4}{8}$ inch.
Large, ,,	$1\frac{4}{8}$
Cœcum, ,,	$0\frac{4}{8}$

The stomach is cylindrical, simply a continuation of oesophagus without fundus, but separated from the small intestines by a valve. In

* During life there is no trace of blue, or even bluish green about this lizard, but after death it sometimes acquires this colour from the effects of spirits of wine, to which circumstance must be attributed the denomination of "*Blue Calotes*," Gray, in Griffith's edition of Cuvier. Vol. 9, p. 55.

several dissected it contained nothing but mucus. The length of oesophagus and the stomach together was $1\frac{6}{8}$ inch. The anterior part of the small intestines is widened till about a quarter of an inch from the pyloric valve, where ductus coledochus enters. Cæcum is very widened, more so than any other part of the canal, of a crescent shape.

GEN. *LOPHYRUS*, *Dumeril*.

Head triangular, more or less elongated, shelving in front; orbital edge arched or angular; nostrils lateral, circular, or oval; tongue papillary, rounded and very slightly notched at the point; in the upper jaw 5 incisors and 2 canines; tympanum superficial; skin of the throat lax, forming in some a scarcely perceptible, in others a highly developed pouch, and an angular cross fold in front of the chest; neck, trunk and tail compressed, with a crest, generally most elevated on the nape of the neck; scales of the trunk rhombic, subimbricate, unequal, (with scattered larger scales); femoral pores none.

LOPHYRUS ARMATUS, (Gray.)

SYN.—*Agama armata*, Gray.

Calotes tropidogaster, Cuvier.*

Acanthosaura armata, Gray.

Orbital edge slightly angular, with a long spine at its posterior extremity; no spinous tubercles on the occiput; on each side of the nape of the neck, immediately above the ear, another long spine, surrounded with 5 to 6 shorter ones, at its base, from whence proceed obliquely over the temple and cheek a curved series of 18 larger polygonal, keeled scales; tympanum thick, circular; on the neck a crest of 8 to 12 long spines, surrounded with numerous smaller ones at the base; at a short interval the dorsal crest, the anterior 5 to 6 spines of which are very long, the rest rapidly decreasing towards the tail; gular pouch very small, not toothed, with scales of equal size; tail subtriangular, with a toothed crest above.

Above. Head chestnut; trunk and limbs blackish green, with a black transversal band in the interval between the cervical and dorsal crests, continued over the shoulders, with numerous pale yellowish white, black-edged, rounded spots, assuming the shape of transversal bands on the limbs and the tail; the larger single scales on the sides, limbs and tail clear sky-blue; from the orbit over the lip 5 to 6 radiat-

* By mistake: *Calotes lepidogaster*, *Régne anim.* 1829. T. ii. p. 39.

ing, black lines. Beneath yellowish white. Pupil circular, iris brown, with a narrow golden ring.

HABIT.—*Pinang, Singapore,*
Cochin China.

At Pinang this species appears to be very local, and not numerous : two individuals examined were obtained from spice plantations in the valley. They were very active and fierce, possessed in a slight degree the power of changing the ground-colour to a lighter hue, and in captivity refused food and water. In a female were found 13 eggs of a yellowish white colour, of an oval shape, $\frac{6}{8}$ inches in length. The stomach contained fragments of leaves and twigs, and a quantity of earth and lime. The latter probably originated from the lime water, with which the spice-trees are copiously sprinkled, to secure them against the attack of insects. The dimensions of the lizard were :

Length of the head, $1\frac{1}{8}$ inch.

Ditto ditto trunk, $3\frac{5}{8}$

Ditto ditto tail, 6

Entire length,.. $10\frac{6}{8}$

Of the intestinal canal :

Small intestines, $7\frac{4}{8}$ inch.

Large, $1\frac{6}{8}$

Cœcum, $0\frac{4}{8}$

The stomach capacious, with thick parietes. The first portion of Duodenum is much widened till within half an inch from Pylorus, where Ductus coledochus enters. Cœcum is of a crescent-shape, much widened, as well as the large intestine.

GEN. DILOPHYRUS, *Gray.*

Head four-sided. Forehead rather concave, face-ridge high. Eyebrows rounded. Occiput with 3 or 4 larger tubercles on each side.

Parotids unarmed. Nape and back with a crest of high compressed scales, with series of smaller scales at their base. The throat rather lax,* with a cross fold behind,† extending up the front of the shoulders. Scales of the back small, rhombic, equal ; of the belly rather

* Add : with a compressed pouch, minutely toothed in front.

† Questionable.

larger, smooth. Tail compressed, keeled and toothed above, with 2 series of elongated keeled scales beneath. Femoral and preanal scales none.

DILOPHYRUS GRANDIS, Gray. (Pl. XX.)

HABIT.—*Pinang Hills.*

Rangoon.

As the only published characters of this species leave its identity with the Malayan somewhat doubtful, they are here preposed.

“*Olive green; sides white spotted, beneath whitish; tail black-banded; head with lines of rather larger scales; crest very high, formed of broad compressed close-set scales, with 3 or 4 series of scales on each side of the base, interrupted over the shoulders.*” (Gray: *Catalogue of the Specimens of Lizards*, &c. p. 239.)

Form. The head is elongated, four-sided pyramidal, its greatest height and breadth being equal, and less than one half of the length. The muzzle is narrow, rounded, depressed. The upper surface of the head is very sloping, with a narrow furrow between the arched orbital parietes; the forehead depressed or concave. The scales are polygonal, keeled; those of the margin of the orbits and forehead larger, imbricate, forming a sharp ridge; four similar scales form a short ridge in the centre of the forehead, close to the muzzle. Behind the orbit, over tympanum, and on each side of the nape of the neck are similar short, oblique ridges, each composed of 5 larger pointed tubercular scales. The rostral shield is very broad, narrow, triangular; the mental, is much smaller, pointed, triangular, with two large polygonal scales on each side. The upper jaw is covered with 26, the lower with 24 elongated, narrow, rectangular scales.

Dentition.

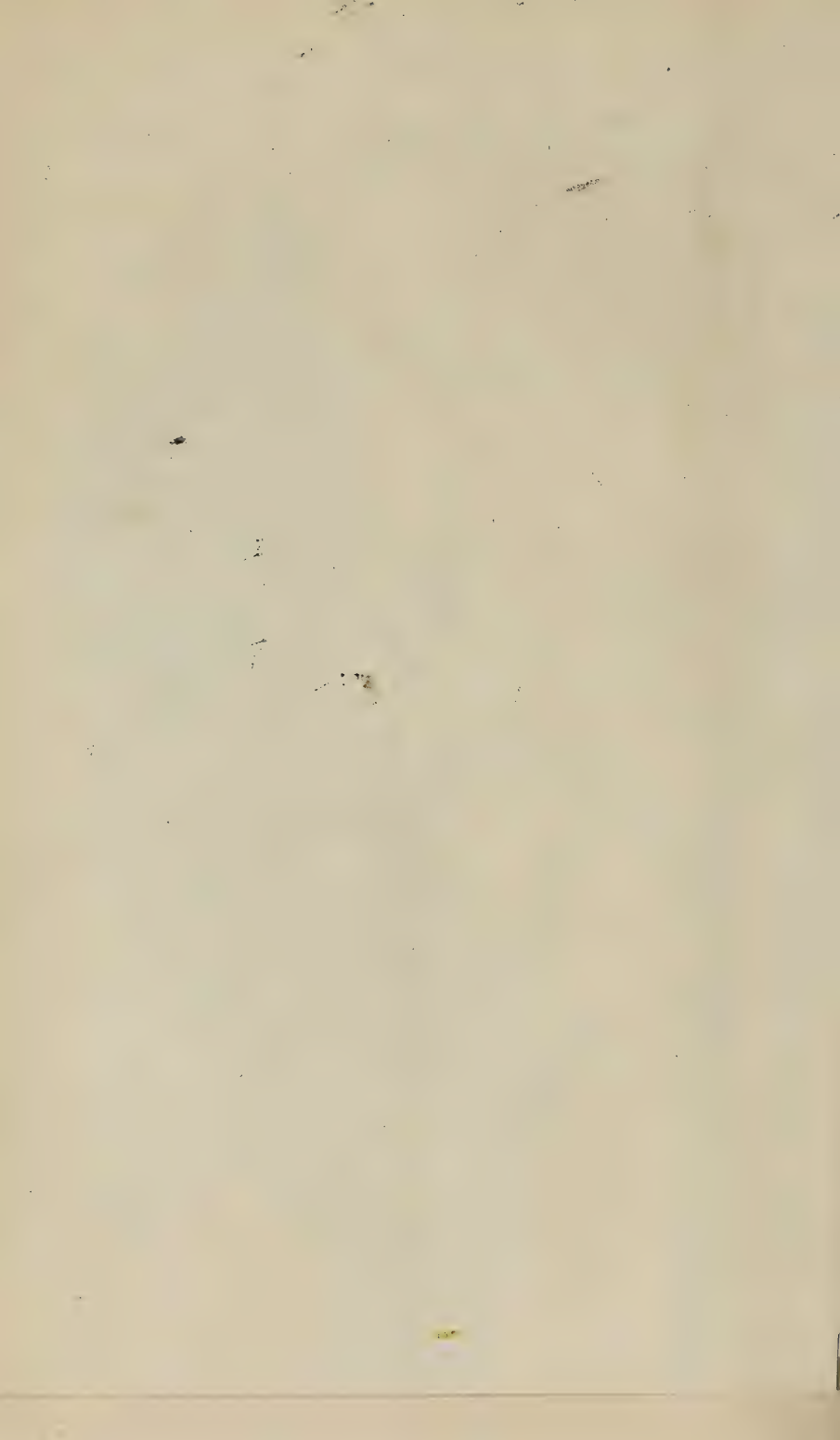
$$\text{Incis. } \frac{6}{4}; \quad \text{Canin. } \frac{1-1}{1-1}; \quad \text{Molar, } \frac{14.14}{14.14} = \frac{36}{34}.$$

The incisors and anterior molars are very small; the latter gradually increasing in size, flat, sharply edged, bluntly tricuspidate. The tongue is thick, flattened, very slightly notched in front, the anterior half spongy, the posterior with large backwards pointed papillæ. The nostrils are nearly circular, pierced in a large oval scale, in front of which 3 scales intervene between the rostral. The eyes are large, sunk in the orbits; the pupil circular, black; the iris blue with golden



DIOPHYRUS grandis

D. Cantor, from life



spots and a narrow ring. The eyelids are covered with very minute polygonal, tubercular scales. Each tarsus with a double row of scales, the inner one of small, polygonal, tubercular; the outer one of rhombic, flat, with the angles overlapping, so as to give the free margin a toothed appearance. The tympanum is large circular. The skin of the throat is very lax, forming a compressed pouch, the anterior margin of which is slightly toothed, owing to the series of scales overlapping each other. But there is during life no trace of any "crossfold behind, extending up the front of the shoulders." The scales of the neck and back are very minute, rhombic, or sub-rectangular, smooth, increasing in size and becoming imbricate on the sides, abdomen, limbs and throat. On the neck is a high arched, toothed crest, composed of 26 large ensiform scales, the 13 anterior gradually increasing in length, the rest decreasing. The base of the crest is supported by two parallel, slightly arched, series of rectangular scales, much larger than those of the rest of the body, but those of the upper series double the size of those of the inferior. The dorsal crest commences at a short interval a little behind the shoulders. In shape and component parts it resembles the former, but is double the extent, consisting of 45 scales, all of which however are inferior in height to those of the cervical crest, which, as well as the somewhat lower, sloping level, renders the dorsal crest less conspicuous than the former. The skin is somewhat lax on the sides of the body, leaving the ribs visible. The tail is very much compressed, attenuated, elongated. Its sides are covered with rather large, smooth imbricate, rhombic scales. The anterior third of the upper margin is toothed, composed of a single row of large, gradually decreasing, sharply keeled scales. The other two thirds are covered by two rows of keeled scales, thus giving the posterior part of the tail a bidentated appearance. The lower surface of the tail is covered by two series of large, gradually decreasing, imbricate, keeled scales, giving it a bidentated appearance. The limbs are slender; the anterior little more than half the length of the posterior, and the toes very short. The posterior 4th toe is excessively long. The palms and soles are covered with minute, pointed, rough scales; the toes above and beneath with sharply keeled, imbricate, rhombic scales. The claws are large, treuchant, curved.

Colours. The ground-colour of the head, neck, throat, gular pouch, and the chest is impure gamboge, the scales edged with brown. The eyelids dark brown, the tarsi buff. A dark blue triangular streak proceeds from the anterior angle of the orbit to the nostril; another is placed parallel with the upper labial scales, which as well as the lower are of a pale blue, as also the tympanum. From the labial scales and tympanum on each side across the throat, the pouch, and the sides of the neck, proceed 7 oblique, undulating, dark blue bands. The tympanum is enclosed by two oblique broad, purple-brown bands, which join each other under an angle at the anterior extremity of the cervical crest, where a third broad, longitudinal purple-brown band commences, proceeding over the side of the neck, then expanding, covers the back and the upper half of the sides of the body, where its lower margin describes two large curves. The lower part of the sides are of a deep lilac, changing on the abdomen to bluish white. On the sides of the body and on the abdomen appear several oblique series of lozenge-shaped spots: a few on the brown portion of the sides of a deep Indian red, the rest bright gamboge. The cervical and dorsal crests are mulberry-brown; the former with the upper half of each of the first 13 scales light green; the latter with the upper half of the first 10 scales pale yellow. The scales at the base of the crests partake of the general colour, but many of them have a pale yellow spot. The tail is above and beneath with alternate broad rings of impure white, the scales edged with brown, and purple-brown, changing to black on the posterior half. The legs, feet and toes are dark purple-brown with indistinct transversal yellowish bands.

Dimensions.

Length of the head,.....	0 foot 2 inch.
Ditto ditto trunk,.....	0 $4\frac{4}{8}$
Ditto ditto tail,.....	1 4

Entire length, 1 foot $10\frac{4}{8}$ inch.

Length of the cervical crest, $1\frac{7}{8}$ inch; height of 13th scale, $0\frac{6}{8}$ inch.
Ditto ditto dorsal crest,..... 3 inch; ditto ditto 15th scale, $0\frac{4}{8}$


Length of humerus,..... 1 inch; of femur, $1\frac{7}{8}$ inch.
Ditto ditto fore arm, $1\frac{1}{8}$ of tibia, 2
Ditto ditto hand and 4th toe, 1 of foot and 4th toe, $2\frac{1}{8}$

Entire length, $3\frac{1}{8}$ inch.

6 inch.

The only individual examined, was captured on a botanical excursion by Sir William Norris on the Pinang Hills, on the bank of a mountain stream, at an elevation of about 2,000 feet. It appeared slow in its movements, of general sluggish habits, showed no power of changing colours, and in confinement it refused insects, vegetable food, as well as water. After having been preserved in rectified spirits of wine for upwards of three years, the specimen has retained the original brown and white colours and the Indian red spot; but the yellow, light-green and light-blue have changed to whitish, and the dark blue marks to blackish. Although the colours in this state do not agree with those given by Mr. Gray, apparently though not stated, taken from a preserved specimen, the peculiar distribution of the markings correspond, and induce me to believe in the identity of the animals.

GEN. DRACO, *Linné, apud Duméril and Bibron.*

Head triangular, obtuse in front, slightly depressed, covered with small scales of unequal diameter. Three or four incisors and 2 canines in the upper jaw. Tongue spongy, thick, rounded, entire.* Tympanum hidden  in some, visible in others. In the centre of the throat an elongated vertical pouch; on each side a smaller horizontal. In general a small cervical crest.† Trunk depressed, with a lateral membrane, supported by the spurious ribs. No femoral pores. Tail very long, thin, angular, slightly depressed at the root.

A.—*Tympanum visible, metallic iridescent.*

DRACO VOLANS, Linné.

SYN.—*Draco volans*, apud Gmel., Latr., Gray.

Draco præpos, Linné, apud Gmelin.

Draco major, Laurenti.

Draco minor, Laurenti.

Le Dragon, Daubenton, Lacépède, Bonnat.

Flying Draco, Shaw.

Draco viridis, Daudin, apud Merr., Kuhl, Wolf, Wagler.

Draco fuscus, Daudin, apud Merr., Kuhl.

Draco bourouniensis, Lesson?

Draco daudinii, Duméril and Bibron.

“Chíchak terbang” or “Kubin” of the Malays.

* In the following species the tongue is minutely, yet distinctly notched,

 i. e. *Dracunculus*; Wiegmann.

† The female of *Draco fimbriatus*, Kuhl, (i. e. *Draco abbreviatus*, Gray,) *D. volans* and *D. maculatus* differs from the male in having no cervical crest, and in having a smaller, less elongated gular pouch.

Scales of the back rhomboidal, imbricate, indistinctly keeled ; of the throat granular, of equal size ; the adult male with a small cervical crest ; tongue minutely notched in front ; gular pouch of the male very long, narrow, nearly double the length of the head ; of the female shorter, broad triangular.

Adult male and female. Head metallic brown or green, with a black spot between the eyes. Back and inner half of the wing-membrane varied with metallic, iridescent dark brown and rose-colour, in some disposed in alternate transversal bands, with numerous black spots and short irregular waved or zigzag lines. Limbs and tail in some with rose coloured transversal bands. Sides of the neck and lips also rose coloured with black spots. Cheeks and eyelids silvery-white or sky-blue, the latter with short radiating black lines. Throat and gular pouch bright yellow, the former dotted with black ; lateral pouches yellow or silvery rose, dotted with black. Outer half of the wing membrane black with indistinct transversal bands, composed of large, sometimes confluent, spots of silvery rose or whitish colour ; the margins appearing as minutely fringed with silver. Beneath either whitish yellow or pale sky blue with metallic lustre ; the membrane largely, the abdomen in some minutely spotted with black or brown. Iris hazel, with a golden narrow ring. *Young* of the same more vivid colours, with a series of double black spots along the spine of the back, and some scattered on the sides.

HABIT.—*Malayan Peninsula, Pinang.*

Philippine Islands, Borneo, Java.

The transcendent beauty of the individually varying colours, baffles description. Such as are current of this and other species, appear to have been taken from preserved specimens. As the lizard lies in shade along the trunk of a tree, its colours at a distance appear like a mixture of brown and grey, and render it scarcely distinguishable from the bark. Thus it remains with no signs of life except the restless eyes, watching passing insects, which, suddenly expanding the wings, it seizes with a sometimes considerable, unerring leap. It is but on close inspection, exposed to the light or in the sun that the matchless brilliancy of its colours appears. But the lizard itself appears to possess no power of changing them. This species is numerous on trees, in valleys and hills. The female, apparently less numerous than the male, car-

ries 3 to 4 eggs of an oval cylindrical shape, $\frac{3}{8}$ of an inch in length, and of a yellowish white colour.—Of a number examined none exceeded the following dimensions :

Lenth of the head,	$0\frac{4}{8}$ inch.
Ditto ditto trunk,	$2\frac{4}{8}$
Ditto ditto tail,	$4\frac{4}{8}$
	<hr/>
	$7\frac{4}{8}$ inches.

B.—*Tympanum hidden by scales.* (DRACUNCULUS, Wiegmann.)

DRACO MACULATUS, (Gray.)

SYN.—*Dracunculus maculatus*, Gray.*

HABIT.—*Pinang.*

Tenasserim.

Form. This species closely resembles *Draco lineatus*, Daudin, (*Dracunculus lineatus*, Wiegmann,) from which it differs in the following particulars. The adult *male* carries a very elongated, pointed gular pouch, double the length of the head, and a slightly elevated cervical crest, consisting of 6 to 8 pointed tubercular scales, and continued along the anterior half of the back in the shape of a ridge composed of a raised fold of the skin. The *female* has neither cervical crest nor dorsal ridge, and her gular pouch is much reduced, its length being about one half of the length of the head. Both sexes have the following characters in common. From each side of the neck commences a series of spinous scales, sometimes close together on one side, distant on the other, which, increasing in size and becoming more distant, continue along the side of the body, where they deviate outwards, marking the origin of the wings, and again converge towards the root of the tail, where they terminate. The scales of the back are generally smooth, consisting of smaller polygonal, mixed with some larger rhombic, indistinctly keeled, imbricate scales. In some individuals the latter are disposed so as to form a series on each side of the dorsal spine. The supraorbital margin has from 3 to 4 large pointed tubercles, of which but the one situated at the posterior angle appears

* "Grey, black-spotted; wings blackspotted; throat grey; pouch of the male elongate; scales of the back rather unequal, rhombic, keeled; of the sides rather smaller; sides with a series of large keeled scales; ears rather sunk, with unequal flat scales; tail slender, with a central keel above, and 5 more small ones on the sides, base dilated, with 5 nearly equi-distant equal keels above." (*Catalogue of the Specimens of Lizards, &c.* p. 236.)

to be constant. The scales of the neck and throat are small granular, from which those covering the tympanum differ by being larger, flattened and polygonal. The tubercles of the throat and neck, and many of the scales of the back, wing-membranes, and the limbs, have each a minute rounded cavity at the point, discernible by a lens. The pouches, chest and abdomen are covered with rhombic, imbricate, keeled scales without apical cavities. Each jaw has 16 labial scales. The tail is long, very broad at the base, particularly in the male, suddenly tapering, rounded above, and covered with strongly keeled, imbricate, rhombic scales. The first large ones of the lowest series of the root form a more or less conspicuous toothed crest. The lower surface is flattened, with scales like the upper. The apex of the tongue is notched.

Dentition.

Incis. $\frac{4}{2}$, Canin. $\frac{1-1}{1-1}$, Molar, $\frac{15.15}{15.15}$.

Colours. This species bears so close a resemblance to *Draco volans*, that it is scarcely possible to point out any difference. The upper parts of the body are metallic greenish brown, varied with golden rose-colour or isabella, indistinctly dotted and lined with black. The wings are golden isabella with transversal black bands, formed by series of black rounded spots, either separate or confluent on the inner half, but blending into one another on the outer-half. In some individuals numerous undulating golden rose-coloured or buff lines longitudinally intersect the bands. The margins are finely fringed with silver. The limbs and tail are indistinctly ringed with black or brown. A black spot on the vertex, between the eyes, appears to be constant also in this species. The gular pouch and the throat are bright yellow, the latter in some dotted with pale brown. The chest and abdomen whitish yellow in some, bluish white in others. The under surface of the wings is of the latter colour, in some with single large rounded black spots near the margins, independent of the upper markings, which may be distinguished through the hemitransparent membrane.

Of this species but four, of which 2 males were received from Sir Wm. Norris. They were all from the Hills of Pinang;* none exceeded the following dimension :

* The Museum of the Asiatic Society possesses two females, obtained by the late Dr. Spry in the Tenasserim Provinces.

Length of the head,	0 $\frac{5}{8}$ inch.
Ditto ditto trunk,	3
Ditto ditto tail,	5 $\frac{2}{8}$
	<hr/> 8 $\frac{7}{8}$ inches.

The intestinal canal of a female measured :

Small Intestines,	3 inches.
Large „	0 $\frac{7}{8}$
Cæcum „	0 $\frac{2}{8}$

The capacious stomach contained remains of insects, particularly of the gigantic black ant, inhabiting the Malayan hill forests. The first portion of Duodenum is much widened till within a quarter of an inch from Pylorus, where Ductus coledochus enters. Cæcum is of a short crescent shape, much widened as well as the large intestine. In the abdominal cavity appeared 5 eggs, of an oval form, yellowish white colour, each half an inch in length.

GEN. *LEIOLEPIS*, Cuvier, *apud Duméril and Bibron*.

Head sub-pyramidal quadrangular with minute, polygonal, tubercular scales. Tympanic membrane a little sunk. Tongue scaly on the anterior, papillary on the posterior half, apex bifid. Chest with a transversal fold in front. Two canines in each jaw. Trunk sub-cylindrical with granular scales above; beneath with larger, smooth, imbricate, rectangular scales. Femoral pores. Tail conical, very long; the root broad and depressed, the rest excessively slender.

To these characters it will be necessary to add: *Skin of the sides of the trunk excessively lax, capable of being expanded into a large wing-like membrane by means of the six anterior, very long, spurious ribs.*

LEIOLEPIS BELLII, (Gray.)

SYN.—*Uromastix bellii*, Gray.

Uromastix belliana, Ill. Ind. Zool.*

Leiolepis guttatus, Cuvier, *apud* { Guérin.
Duméril and Bibron.

Cynosaurus punctatus, Schlegel.

Leiolepis bellii, Gray: Catal.

* In the supposition that this incorrectly drawn and coloured figure has been taken from the living animal, M. M. Duméril and Bibron have been led to publish an erroneous description and figure. The last description of this species of Mr. Gray appears to be founded on the same authority. It runs thus: "Olive with black edged white spots and a black edged white streak on each side, beneath whitish." *Catal.*, &c. p. 263.

Ground-colour, above blackish-grey ; the back and sides with 7 parallel lines of pale sulphur colour, edged with black, the 2nd from below, the 4th and 6th composed of more or less confluent spots, the other 3 of distant round spots. The expanded membrane black with 7 or 8 broad distant, transversal bars of a brilliant orange. The tail above with numerous small pale yellow spots. The forelegs with orange coloured rounded spots, some of which tipped with azure ; the hindlegs minutely spotted with yellow. The throat pale azure ; abdomen pale orange, marbled with broad bluish black veins ; the tail beneath pale yellowish white. The lower eyelid is pure white ; pupil circular, iris hazel with a narrow golden ring.

HABIT.—*Malayan Peninsula, Pinang.*

Cochin-China.

The head is covered with small elongated polygonal keeled scales ; the upper jaw with 26, the lower with 18 to 20. The mental shield is elongated, polygonal ; the upper part of the sides is joined to the first lower labial scale ; the centre part is on each side in contact with the first of series of 13 to 15 elongated polygonal scales, which follow the tract of the labial, between which there is a narrow intervening space covered with smooth polygonal scales, larger than those of the rest of the throat. The back and wing-membranes are covered with minute granular scales ; the abdomen with larger smooth rhombic scales. Those of the tail, above and beneath are verticillated, rectangular, subimbricate, and strongly keeled. The tongue is thick, fungous, not scaly as incorrectly represented, with the tip much flattened, free and slightly extensile, divided in two laterally compressed sharp points.—The molar teeth are tricuspidate, increasing in size, the anterior being the smallest. In the adult they are much worn and incrustated with brown tartar, like the teeth of *Semnopitheci* and *Ruminantia*.

Dentition.

Incis. $\frac{4}{1-1}$, Canin. $\frac{1-1}{1-1}$, Molar. $\frac{12.12}{11.11}$.

The nails are long, slightly arched, of a pale yellowish horn-colour.

The wing-membrane in a state of repose appears like a longitudinal loose fold, extending along each side from the axilla to the inguinal region. Expanded the external margin becomes arched, the trunk and the membranes forming a greatly flattened oval disk, (strongly contrasting

with the bulky appearance of the parts in a state of repose,) resembling the hood of *Naja*. The transversal diameter of the disk across axilla and the inguinal region is $1\frac{1}{8}$ inch; across the centre $2\frac{2}{8}$ inches. Like the mechanism of the Genus *Draco*, the membranes are expanded by means of the very long six anterior pairs of spurious ribs, which the lizard has the power of moving forward under a right angle with the vertebral column. The six posterior ones are excessively short, and though equally moveable, do not appear materially to assist in expanding the membranes. The latter are used as a parachute in leaping from branch to branch, after which they immediately resume their state of repose. Sudden fear, or anger will also cause a momentary expansion. The femoral pores are situated on a series of rather large rhombic scales on each thigh. In a number of twelve adult individuals, the pores varied from 13 to 19 on each thigh. In the specimens in the Paris Museum, described by M. M. Duméril and Bibron, there are from 20 to 24 on each thigh.

This species appears to be numerous, but local. Twelve were at one time obtained from a spice plantation in province Wellesley, some of which were in the act of changing the integuments. They were very active and swift, more so than their rather heavy make would induce to believe, and they would bite and scratch when handled, although among themselves in a spacious cage, they appeared peaceable, and patiently submitted to being trodden, or run over by a neighbour, about ascending the perch. The Malay, who brought the lizards, asserted they were frugivorous, and might be fed with soft fruit and boiled rice, which was perfectly true. In one immediately examined, the stomach and intestines contained rounded seeds of various kinds from the smallest size to that of a large pea, and vegetable fibres.*

The rest refused insects and different kinds of fruit, but during the several months' confinement each would daily eat a little boiled rice, and occasionally take water. Of these none exceeded the following dimensions :

Length of the head,	0	ft.	$1\frac{1}{8}$ inch.
Ditto ditto trunk,	0		$4\frac{2}{8}$
Ditto ditto tail,	1		0
<hr/>			
Entire length,	1	foot	$5\frac{3}{8}$ inch.

* The latter, however, as well as sand and fragments of stones, also occur in carnivorous and insectivorous lizards, as well as serpents, which swallow these substances to stimulate digestion.

Length of the intestinal canal :

Small intestines,.....	5 $\frac{6}{8}$ inch.
Large ditto.....	3
Cæcum,	0 $\frac{2}{8}$

The stomach is of a lengthened pyriform shape, one inch in length ; Duodenum, narrow, receives Ductus coleductus at $\frac{3}{8}$ inch distance from Pylorus.—Cæcum is very short, nearly circular. The large intestine is sacculated, terminating in a short simple rectum.

There seems to be reason to believe that *Leiolepis revesii*,* Gray, inhabiting “China” and Arracan, is also found on the Malayan Peninsula.

FAM. SCINCIDÆ, Gray, (LEPIDOSAURES, Duméril and Bibron.)

SUB. FAM. SAUROPHTHALMINÆ, Cocteau.

GEN. GONGYLUS, Wagler, apud Duméril and Bibron.

Nostrils lateral, pierced either through the nasal, or between the nasal and rostral shield ; tongue notched, squamous ; teeth conical, often slightly compressed, and as it were wedge-shaped, simple ; palate toothed or not, with a posterior notch or a longitudinal groove ; auricu-

* Syn. *Uromastix revesii*, Gray.—“Olive with a series of bright red spots on each side.” (Griffith : Animal Kingdom, IX. p. 62.) Such was the only account of this species at the time of the publication of *Erpétologie Générale*, where it is not introduced. Mr. Gray’s latest description runs thus : “Olive with longitudinal series of pale whitish spots ; when alive blackish, with orange spots on the back, and a series of bright red spots on the sides.—China.” (Catalogue, &c. p. 263.)

The Museum of the Asiatic Society possesses an adult male and a young specimen, sent from Arracan by Capt. Phayre. The form resembles in every particular that of *Leiolepis guttatus*, from which the present species principally differs by its colours, larger, heavier make and size. Each jaw is covered by 20 scales. From the mental scale proceeds a series of 10 larger scales on each side below the labial. On the throat appear 2 or 3 strong transversal folds, of which the anterior commences from the posterior margin of the tympanum. The tail is covered with keeled verticillate scales as in *L. guttatus*, but not with “rings of smooth scales” as Mr. Gray’s generic character states.

Dentition.—Incis. $\frac{4}{1-1}$, Canin. $\frac{1-1}{1-1}$, Molar. $\frac{10-10}{10-10}$, Femoral pores 20.

Length of the head,	0 feet 1 $\frac{1}{8}$ inch.
Ditto ditto trunk,	0 6 $\frac{1}{8}$
Ditto ditto tail,	1 0

Entire length, 1 7 $\frac{5}{8}$ inch.

lar apertures ; four feet, each with 5 unequal, slightly compressed, not dentilated, nailed toes ; sides rounded ; tail conical or slightly compressed, pointed.

SUB-GEN. EUMECES, *Wiegmann*.

Nostrils pierced through the nasal shield, near the posterior margin ; 2 supernasal shields ; palate not toothed, with a rather shallow triangular notch behind ; scales smooth.

EUMECES PUNCTATUS, (Linné,) Var.

SYN.—*Lacerta punctata*, Linné.

Stellio punctatus, Laurenti.

La Double raie, Daub., apud Lacép, Bonnat.

Lacerta interpunctata, Gmelin, apud { Donnd.
Shaw.
Latreille.

Scincus bilineatus, Daudin.

Scincus punctatus, Schneider, apud Merrem.

Seps scincoides, Cuv. apud Griffith, A. K.

Lygosoma punctata, Gray, apud Griff. A. K.

Riopa punctata, Gray.

Tiliqua cuvierii, Cocteau.

Tiliqua duvaucellii, Cocteau.

Eumeces punctatus, Wiegmann, apud Dum. and Bibr.

Riopa hardwickii, Gray : Catal, (Young.)

Trunk individually varying in length ; limbs very small, giving the lizard a blindworm-like appearance ; tail very thick at the root, fusiform, tapering to a very sharp point, its length varying from one to two-thirds of the entire length of the animal. On the anterior margin of the ear a small tubercle. Above metallic chestnut, or greenish bronze, in some with 6 more or less distinct, dotted, black lines along the back, or with the two rows of scales nearest each side of a lighter shade than the ground colour, thus forming two lighter longitudinal bands. From the nostril to the middle of the side of the tail a black or brown band, with numerous small white spots on the sides. Limbs outside dotted with white. Beneath sulphur-coloured, in some the throat and tail minutely dotted with black. Iris dark brown, with a narrow, circular, golden ring.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

Malabar and Coromandel Coast, Bengal.

The Variety described above, is numerous in the Malayan countries, both on hills and in valleys. Of several the largest individual was of the following dimensions :

Length of the head, $0\frac{3}{8}$ inch.

Ditto ditto trunk, $2\frac{1}{8}$

Ditto ditto tail, $1\frac{7}{8}$

Entire length, $4\frac{3}{8}$ inches.

SUB. GEN. EUPREPIS, *Wagler*.

Nostrils pierced through the posterior part of the nasal shield ; two super-nasals ; palate with a more or less deep triangular incision ; pterygoid teeth ; scales keeled.

EUPREPIS RUFESCENS, (Shaw.)

SYN.—*Lacerta maritima maxima*, &c. Seba II, Tab. 105, Fig 3.

Lacerta rufescens, Shaw, III, P. 1, P. 285.

Scincus rufescens, Merrem, apud { Cuvier.
Gray in Griffith, A. K.

Scincus multifasciatus, Kuhl.

Mabouya multifasciata, Fitzinger.

Euprepis multifasciatus, Wagler.

Tiliqua fufescens, Gray.

Eumeces rufescens, Wiegmann.

Tiliqua carinata, Gray.

Tiliqua affinis, Gray, (Young.)

Euprepes sebæ, Duméril et Bibron.

Body strong ; limbs proportionate ; tail rounded, slightly compressed, little exceeding half the entire length. Scales of the back and sides : in the young with 5 to 7 keels ; in the adult the dorsal scales with 3 to 5 keels, the rest smooth. The anterior margin of the ear with 3 or 4 minute lobules. Lower eyelid with a series of 4 or 5 larger, square scales. Pterygoid teeth minute, few, hid in the palatal membrane, forming a short line on each side of the triangular incision of the palate.

HABIT.—Sandwich-Islands, Philippines, Timor, Celebes, Borneo, Java, Coromandel, Bengal.

VAR. D., Duméril and Bibron.

Above. Ground colour shining bronce with 5 to 7 zigzag, or dotted black lines, in some continued on the tail ; sides with many of the scales black, with a square white spot in the middle, in some arranged so as

to produce numerous, distant, transversal bands. The margins of some or all the shields of the head black. Beneath sulphur-coloured. Iris black with a golden circular ring.

HABIT.—*Malayan Peninsula, Pinang, Singapore.*

VAR. E., Duméril and Bibron.

Above uniformly shining bronze ; sides in some sprinkled with blood red ; rest like the preceding.

HABIT.—*Same localities.*

VAR. F., Duméril and Bibron.

Above uniformly shining bronze ; the anterior half of the sides with a broad blood-red stripe, which in specimens preserved in spirits of wine changes to whitish, or disappears ; the posterior part of the sides of the body and the anterior of the tail in some with square sky-blue spots in the middle of some of the scales ; rest like the preceding.

HABIT.—*Same localities.*

These three varieties are exceedingly numerous in the hills and valleys of the Malayan countries. They may be seen basking in the sun, in bamboo hedges, or on trees, and they fearlessly enter houses in pursuit of insects, in which they display great agility. The female deposits 6 to 12 yellow white, oval, cylindrical eggs, half an inch in length. Nearly all have on the lower two-thirds of the tail a series of large scuta. In one individual observed the last two-thirds of the back of the tail was covered with a single series of very broad scales, of which each of the anterior had 15 to 16 keels. In another the tail had been lost near the root, and reproduced by a pyramidal, soft, naked process, $\frac{3}{8}$ inch long, with circular folds like those of the body of *Ichthyophis*.—*Var. F.* appears to exceed the others in size : the largest was of the following dimensions :

Length of the head,	$0\frac{5}{8}$ inch.
Ditto ditto trunk, :	$3\frac{4}{8}$
Ditto ditto tail,	$4\frac{4}{8}$

Entire length : $8\frac{5}{8}$ inch.

EUPREPIS ERNESTII, Duméril and Bibron.

SYN.—*Scincus ernestii*, Boie, MSS.

Psammite de Van Ernest, Coctean.

Dasia olivacea, Gray : Catal.

Form like *E. rufescens*. Triangular incision of the palate very small, with a few minute pterygoid teeth on each side. Ears obliquely oval, small, appearing more so being half covered by two of the temporal scales; no lobules on the anterior margin. Scales of the back with minute, longitudinally waved lines, and from 3 to 8 indistinct keels. The outer half of the toes and the nails sharply compressed. A series of scuta beneath the tail.

Very young. Head light green bronze, shields edged with black and a black line, edged with silver, from the muzzle to the ear. Back, sides, root of the tail and outside of the limbs shining black with numerous transversal, waved, silvery lines. Feet and toes rose, or flesh-coloured. Tail brilliant scarlet.* Throat, abdomen and inside of the limbs silvery white.

Adult. Ground colour greyish-brown bronze. Frontal and supra-orbital shields black edged; fronto-parietals, inter-parietals and parietals black, each with a whitish elongated mark, united, forming a symmetrical figure. From the nostril to the eye a black streak. Neck and body with a number (12 to 14,) of distant, transversal, waved bands, composed of black scales, each with a rectangular white spot in the middle. Outside of limbs with 4 or 5 similar bands. In some a buff coloured lateral band on the posterior part of the back, and the anterior half of the side of the tail. Beneath iridescent light bluish-green; scales with whitish edges. Iris black with a golden narrow circle.

HABIT.—*Malayan Peninsula, Pinang.*

Java.

In habits this species resembles *Euprepis rufescens*, but appears to be far less numerous. In a female were found eleven eggs, in shape, size and colours resembling those of *E. rufescens*. The young, above described, was of the following dimensions:

Length of the head,	0 $\frac{3}{8}$ inch.
Ditto ditto trunk,	1
Ditto ditto tail,	1 $\frac{6}{8}$
<hr/>	
Entire length: 3 $\frac{1}{8}$ inch.	

* The very young of *Eumeces lessonii*, Dum. and Bibr. (*Scincus cyanurus*, Lesson,) is distinguished by a similar distribution of colours.

Of the two adult individuals the large measured :

Length of the head,	0 $\frac{6}{8}$ inch.
Ditto ditto trunk,	3 $\frac{2}{8}$
Ditto ditto tail,	4 $\frac{4}{8}$

Entire length : $8\frac{4}{8}$ inches.

SUB-GEN. **LYGOSOMA**, *Gray, apud Dum. and Bibr.*

Nostrils pierced through the nasal shield; no supranasals; palate toothless, with a small triangular incision, situated far back; scales smooth.

LYGOSOMA CHALCIDES, (Linné.)

SYN.—*Scincus pedibus brevissimis*, &c. Gronov. P. II, No. 43.

Lacerta chalcides, Linné.

Angvis quadrupes, Linné, apud Hermann.

Le Chalcide, Daubenton.

Der Vierfuss, Müller.

Lézard vert à écailles lisses, Vosmaer.

Lacerta serpens, Bloch, apud { Hermann.
Gmelin.
Leske.
Donnd.
Shaw.

Angvis quadrupède, Lacépède.

Chalcida serpens, Meyer.

Lacerta serpens, Donnd, apud Shaw.

Seineus brachypus, Schneid. apud Merrem.

Chalcides serpens, Latreille.

Seps pentadactylus, Daudin.

Seps (Angvis quadrupes, Lin.) Cuv., apud Griffith, A. K.

Mabouya serpens, Fitzinger?

Lygosoma serpens, Gray, apud { Wagler.
Griffith, A. K.

Lygosoma aurata, Gray, apud Griffith, A. K.

Tiliqua de Vosmaer, Cocteau.

Lygosoma brachypoda, Duméril and Bibron.

Podophis chalcides, Gray: Catal.

Blindworm-like; limbs excessively small; tail strong, conical, about two-fifth of the entire length. A single large lozenge-shaped frontoparietal shield. Ear minute, circular. Lower eyelid scaly, with a few larger scales. Preanal scales larger than the rest.

Ground colour : iridescent lighter or darker copper, or bronze, in some with indistinct dark brown zigzag lines, produced by the scales being laterally edged or dotted with that colour. Beneath pale or whitish yellow. The tail in some minutely dotted with brown. Iris black with

a minute golden ring. The supraorbital scales being somewhat transparent, the black colour of the eye gives them a blackish appearance.

HABIT.—*Pinang*.

Singapore, Java.

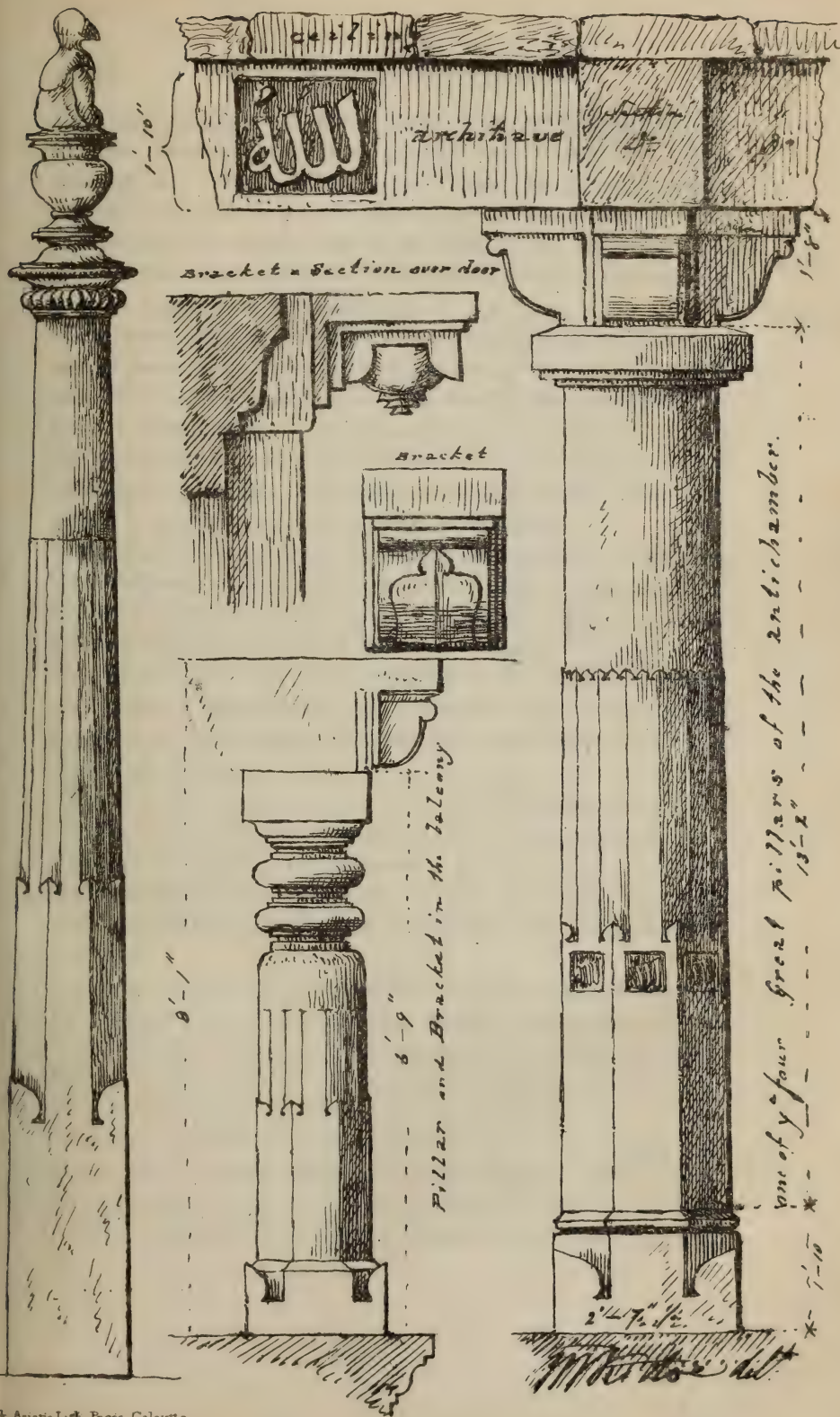
But two individuals were observed on the Great Hill of Pinang, one by Sir W. Norris, the other by myself. The latter made its appearance through a hole in the soft, moist mould beneath a group of *Polycopodium horsfieldii*. Above ground its movements were very quick, serpent-like, apparently little assisted by the tiny limbs. The head of the larger measured $\frac{2}{8}$ inch, the trunk $2\frac{7}{8}$ inches in length. One had but 4 toes on the anterior feet. In both the tail was reproduced, which is also the case in a third, from Singapore, preserved in the Museum of the Asiatic Society.

On the Temples and Ruins of Oomga, by Capt. M. KITTOE, 6th N. I.

As occasional notices of the nooks and corners of Hindoostan may prove interesting to many readers of the Journal (notices that it must be in the power of many of the Civil and Military servants of Government and others to furnish and at little cost), I venture to set the example by offering the following description of a locality once famous in the province of Behar, called Oomga, situated within a mile of the dawk Bungalow of Mudunpoor, and fourteen west of Sheerghatti, a visit to which will ever repay the lover of the antique and picturesque for his pains.

The object which first strikes the traveller is the lofty conical tower of a Temple perched on the westernmost and lower spur of a cluster of hills to the south of the Benares road, the rock composing which is a very coarse grained (porphyritic?) granite affording materials for this and all the other Temples (said to be 52 in number) of however small dimensions.

The height of the great Temple from the rock to the crest may be about 60 feet, the extreme length from east to west is 68ft. 6in. and the breadth 53.



As this structure is perfect I prepared the annexed ground plan with an elevation of the eastern entrance and of two of the pillars, brackets, &c. These will give a better idea than I could convey in writing; the north and south balconies or porches being both alike, I have given the ground plan of the lower of one, and of the upper story of the other; the date of this edifice is found in a Sanscrit inscription I shall treat of further on.

The exterior shape is that common to most buildings of the kind erected between the 12th and 15th centuries of the Christian era, of which so many fine specimens are to be found in the province of Cuttack: the materials being very hard and coarse-grained would not have admitted of minute ornament, consequently such is confined to bold mouldings and recesses producing the usual and pleasing effect. The interior is nearly as devoid of ornament as the exterior.

The Temple being dedicated to Jugnath (as "Narain") has no idols, but a Singhasun or throne on the west wall (facing the east), on which the wooden blocks representing the triad of Sri Jeo, Bulbudra and Seubudra were formerly placed, but is now occupied by fragments of other figures—there are also two of Ganesh in the ante room or Subha.

The pillar or Garura-stamba which formerly supported Garadu, still stands on the space in front of the entrance, and is about 14 ft. high, a single block of granite.

The four large columns in the Subha are likewise single shafts 10 feet each, or capitals and bases included, 16 ft. 8 in. $\times 2\frac{1}{4}$ in thickness; their shape will be observed is that common in Hindu architecture, viz. 1st portion square, 2nd octagon, third 16-sided, and fourth circular, the capital being likewise circular and surmounted by four armed brackets or corbets.

A remarkable feature in this Temple (to which its preservation from the destructive hand of Mahomedan fanatics may be attributed) is its bearing cufic inscriptions over the entrance doorway, as well as those of the two small chambers, also on the eight sides of each pillar and on the architraves, the latter consist simply of the word "Allah." The former appear to be extracts from the Koran, but having been chiselled off it is nearly impossible to make them out. This piece of mischievous folly, I regret to record, is attributed to a European officer, at whose suggestion the late Rajah Gunsam Sing of Deo caused it to

be done, and the words "Ramjee," "Sri Ram," "Sri Ganesh," "Sri Jugnath," "Bulbudrajee," &c. &c. have been scratched in common Nagree to supply their place, as his European friend suggested that it was not right to allow Mahomedan badges to remain in a Hindu Temple: however, his having at the same time recommended substantial repairs which were executed, may be considered as some slight set-off to such outrageous folly.

The next object worthy of notice is a large slab of chlorite containing the long inscription before mentioned, recording the building of the Temples, and other great works which surround it. This I regret to state is said to have been taken from its proper site by another indiscreet officer with the intention of carrying it away; it has been lying out of doors trodden under foot and used as a whetstone till very much injured; I have had it set upright within the Temple, where I hope it will be preserved. I offered two years ago to have it properly fixed, but the young Raja of Deo, like all his kindred, made excuses owing to some absurd suspicion of my intentions, a suspicion which pervades all alike, and is the greatest bar to finding such valuable records of bygone times and events. The Raja informs me that a fine slab was taken from the Deo Temple by some gentleman (name unknown) many years ago to Benares. I have had one verse given me that the Brahmins know by heart, only that they have added several zeros to increase the date; this may give a clue to what has become of it. Shame upon such mischievous spoliation!

The view from either balcony of the Temple is very extensive and beautiful; two prettier landscapes could not be seen in any country—from the south the visitor looks down on the site of the deserted and ruined town of Oomga, with its magnificent tank and high square mound surrounded by a (now) dry ditch, once the Noor or palace of Byrub Indra, the founder, and subsequently of the Oomga Chiefs, the last of whom, Purbeel Singh, was attacked by the emperor (name unknown), his town and palace sacked and laid in ruins, and himself taken to Aurungabad, a town 14 miles further west, and there blown from the muzzle of a gun.

The Tank is now much choked with mud, and in the hot weather dries up, it is about 300 yards long by 200 wide, has a sluice in the centre of the northern face which empties into an extensive "Ahur" or

reservoir covering many acres of ground, the banks of which as well as those of the Tank, formed part of the town enclosure and defences : on the east side in the centre and opposite the palace, is a fine Ghat or flight of stone steps—there is also an elegant pillar in the centre of the tank, about 20 feet high, a single block of granite, the capital not included. The Tank “Ahur,” and city walls (mud), had, till three years back, fine bamboo hedges which are now no more, for strange to say, the whole blossomed and bore seed like rice, after the ripening of which the plantation died, though it is said to have existed for several centuries—it was expected that fresh shoots would spring up, but such has not been the case.

About five hundred yards further west is another fine Tank, 200ft. square, and it is much to be regretted that these as well as many other fine reservoirs in the district are allowed to fill up without an attempt to clear them, a labour which would be amply repaid in a few years. This remark is more particularly applicable to many of the noble Tanks in the north-west provinces built by the emperors of Dehli, and their ministers. Surely a little encouragement on the part of Government and of the Civil functionaries in districts, wealthy individuals might be induced to bestow a portion of their hoardings on undertakings which would perpetuate their names ; it would cost far less to repair such tanks than to dig and construct others of a fraction of their dimensions, and be of greater service—though I believe that there exists a prejudice against repairing the works of others—the result of false pride, but no doubt were encouragement given a sounder feeling would arise.

The fort of Oomga has been very injudiciously placed, for although the hills which command it were impracticable for artillery, still wall pieces and small arms would be used against it with deadly effect.

The hills are, as I have before said, covered with small temples, chiefly to Mahadeva and Ganesh ; the natural hollows at the top have been converted into reservoirs, beside one of which is an idol called Oomgeswuree, to which goats and buffaloes are sacrificed ; a fair is also held once a year.

Although we learn from the flowery Sanscrit verses that Bhyrub Indra built temples, dug tanks and wells, &c. I am convinced that the spot has been dedicated to the worship of Mahadeva and his emblem, the Lingam, for centuries previous to the advent of that chief, for some of

the Linga are very ancient and have been covered in with brickwork. Bhyrub Indra appears to have had great power in this province, and to have expended much wealth in building Temples. There is one at Deota Surya (the sun), and another to the same deity at Kooch near Takuree, 14 miles north-west of Gya, mention of which is made by Buchanan, whose notice the present inscription as well as the locality appears to have escaped. It is surprising that an indefatigable inquirer should have learnt or said so little of a person whose name and exploits are so well known in the district. Nevertheless the name is not to be found in any of the lists of dynasties published by Prinsep; hence we may infer that he was some powerful usurper in the early part of the 15th century during the reign of the Puthan emperor Mohummed Shah the Sumbat date given in 1495, A. D. 1439, in the light half of the month of Vaisakh, which seems from the many inscriptions I have collected to have been a favorite period of the year for dedications of the kind.

Since writing the foregoing I have been favoured, through the kindness of a gentleman of known acquirements, Seyed Azmud Deen Hossein, Deputy Collector of Behar, with the following translation of two lines of the Cufic inscriptions, which I had almost despaired of being ever decyphered: they clearly allude to the event handed down by the tradition I have alluded to; a victory is recorded, but by whom still remains doubtful. The longer inscription over the great doorway most probably contained both the name of the conqueror and the date of conquest; we can only then lament the more the act of folly which has deprived us of the information; the next sentence *نَصْرٌ مِنَ اللَّهِ فَتَحَ بِشِيرٍ قَرِيبَ* only differs in the word *بِعَوْنِهِ* instead of *بِشِيرٍ* the literal meaning of which Azmud Deen gives as "By the help of God Victory is gained," though perhaps some might construe it thus "By the help of God Victory is nigh at hand."

I send also a rudely executed inscription from the walls of the Sooruj Mundir at Deo, which my draftsman tells me is executed in plaister; the date is Sumbut 1605; the Temple is said to be very perfect; I only regret I have no leisure to prepare a drawing, which would be useful. I suspect that the great inscription, plundered as before stated, must have been dedicated to some deity other than "Surya" or the Sun as

the door faces the west instead of the east; it may have been a Budha Temple. In the verse of the inscription given by the Brahmins Budda as the son of Iln is mentioned. Divesting the figures given of the string of zeros, we have the dates 1293 Sumbut, or A. D. 1239, by the original inscription, and A. D. 1548 or S. 1605, in that now sent, which for the first gives a difference of 202 years earlier than the Oomga Temple, consequently it could not have been built by Bhyrub Indra as related.

On the Gamboge of the Tenasserim Provinces, by the
Rev. F. MASON, A. M.

In conversation with a distinguished medical officer, and member of the Asiatic Society, I found that he was not at all aware that the Tenasserim Provinces produce Gamboge. It has therefore occurred to me that a brief notice of the Gamboge of these provinces might not be unacceptable to the readers of the Journal, and would contribute its influence to draw attention to a most interesting portion of the British Provinces in the east; one that is exceeded by few in the richness and variety of its natural productions.

Three works in my possession describe Gamboge each as the product of a different tree; a fourth represents all to be wrong, and a fifth suggests a different plant, still. One refers it to *Cambogia gutta*, a plant which, as described by Linneus, has probably no existence. He described a Ceylon plant, and it is now quite evident, says Dr. Wight, "that the character of the flower and ovary is taken from one specimen, and that of the fruit from a different one, owing to the imperfection of his specimens, and his not being aware that the lobes of the stigma afford a sure indication of the number of cells of the fruit."

Another refers it to *Garcinia cambogia*, but Dr. Wight says that the exudation of this tree is "wholly incapable of forming an emulsion with the wet finger," a statement which the writer knows to be correct. The tree is very common in the Tenasserim Provinces, but the bright yellow exudation it produces is certainly not Gamboge.

A third refers it to *Stalagmitis cambogioides*, but Dr. Wight remarks "The juice of this tree differs so very widely in its qualities from good Gamboge, that it can never be expected to prove valuable as a pigment."

Dr. Graham has described a Ceylon tree under the name of *Hebradendron cambogioides*, which is said to produce good Gamboge; but no Gamboge has ever been exported into the English market from Ceylon. Thus it would appear, to use the language of Dr. Wight, that "the tree, or trees, which produce the Gamboge of commerce is not yet known."

Dr. Helfer who was employed by government as a scientific naturalist in these Provinces, at an expense of *thirteen hundred* rupees per month, reported "the Gamboge of this country dissolves very little with water, and consequently does not yield that yellow emulsion as the common *guttifera*. It will never serve as a color, but promises to give a very beautiful varnish." This statement was controverted by a writer in our local periodical at the time, who said he had obtained "fine Gamboge of the very best description" from our jungles; in which he was no doubt correct, but he erred when he added that it came from the "true *Stalagmitis cambogioides*." A very small amount of botany would have served to preserve him from falling into this error; for that plant has a quinary arrangement of its flowers, while the arrangement of the flowers in those that produce Gamboge in these Provinces is quaternary.

The hills that bound the valley of the Tavoy river, on both sides, from their bases to their summits, abound with a tree which produces a fine Gamboge. It is Roxburgh's *Garcinia pictoria*, which he knew produced Gamboge, but which he said was liable to fade. As soon as I satisfied myself of the identity of the trees by an examination of the inflorescence of our plant compared with Roxburgh's description, I colored a piece of paper, one band with this Gamboge, and another with the Gamboge of commerce; and subsequently exposed both to the weather equally for more than twelve months, but without being able to discover that one faded any more than the other. South of the latitude of the mouth of Tavoy river, and throughout the Province of Mergui, there is found on the low plains at the foot of the hills, and on the banks of the rivers, almost down to tide waters, another species of *Garcinia* that also produces good Gamboge. I have no doubt but it is the tree from which Dr. Griffiths furnished Dr. Wight with specimens, and which the latter says, "I refer doubtfully to Wallich's *G. elliptica*." We will call it then *G. elliptica*, a species which Dr. Wight has

on his list of "species imperfectly known." The foliation and female flowers are however, very well described, and to complete the description, I may add the male flowers are pedunculated, but the peduncles are shut, and they might be characterized as sub-sessile. The anthers, like those of the female flowers, are sessile, depressed or flattened above, and dehisce circularly. The ripe fruit is globose, and not furrowed. As I send along with this paper specimens of both the male and female flowers, any of your botanists will be able to correct me at a glance, if I be in error.

Neither Wallich, Wight, nor Griffiths appear to have been at all aware that this species produces Gamboge. Dr. Wight, in a recent number of his *Neilgherry plants* says, "Two species of the genus *Garcinia* are known to produce Gamboge, most of the others yield a yellow juice, but not Gamboge, as it will not mix with water." The species which he has described as producing Gamboge, and to which I suppose he refers, are *G. Gutta* or *H. Cambogioides*, (Graham,) and *G. Pictoria*, (Roxburgh.) That others may be enabled to judge of the character of the Gamboge produced by this tree, I have the pleasure to send specimens of its exudation. In its appearance to the eye, and in its properties as a pigment, I have failed to discover the slightest difference between it and the Gamboge of commerce. It serves equally well to color drawings, the Burmese priests often use it to color their garments and the Karens to dye their thread. It is also used by the native doctors in medicine, but I think not extensively. Dr. Lindley, in his new work the "*Vegetable Kingdom*," says:—"The best Gamboge comes in the form of pipes from Siam, and this is conjectured to be the produce of *Garcinia Cochinchinensis*." As *G. elliptica* is spread all over the Province of Mergui, is it not probable that it extends into Siam, and that the Siamese Gamboge is the produce, a part at least, of this tree?

There are several other species of *Garcinia* indigenous to the Provinces, but I know of no others producing any thing resembling Gamboge, except *G. Cambogia*; the exhudation of which, though it will not dissolve in water, dissolves in spirits of turpentine and forms a very beautiful yellow varnish for tin and other metallic surfaces.

*On a Sculpture from the Site of the Indo-Greek city of Bucephalia ;
by Captain JAMES ABBOTT, Boundary Commissioner, &c.*

Herewith I have the pleasure to enclose you a drawing of a sculptured red freestone, dug from the Site of the Indo-Greek city of Bucephalia on the Hydaspes, by, I believe, General Ventura, and now lying in front of the castle of the present city of Jelum. It is one of many relics disinterred from time to time, in searching for bricks, all those used in Jelum being thus derived. The tracery is evidently Greek ; for there is no such design to the best of my belief in Hindoo sculpture, and it seems to have been the lintel of a temple to Ceres or to Bacchus. Many Indo-Greek coins are found in the same spot, and it is here that the Empire seems to have found its eastern limit. The sculpture is in good preservation owing to having been buried so many hundred years. Its style is as decidedly Grecian, as its outline, being altogether deeper and more massive than that of the Hindoos, although I am not sure that it has any advantage in delicacy or grace. The square panels upon the pilaster, seem to me Hindoo ; but both the lozenge and the ellipse are Greek or Egyptian, as is the Thyrsus, if I rightly designate as such the two undefaced figures of the beading. I do not know whether the maize represented in this sculpture was known to the Greeks previous to the conquest of Alexander ; but it seems probable that Osiris, whose conquest of the Punjaub appears almost as well authenticated as that of Alexander, must have brought it with him from India, if indeed he did not first introduce it there. It seems to me that I have met with it in sculpture brought from Greece. Other portions of the same temple are said to have been removed by General Ventura. I shall not omit any opportunity of observing them, should I return to Lahore, where they are supposed to be. This fragment is very massive, being about six feet in length and 20 inches thick. If you consider it worth removal, which I should doubt, it could be conveyed by water free of expense to Ferozpoor or Loodiana.

My professional duties have so little leisure for transcribing sketches that I have found it impossible to complete this until now. Meanwhile, on a visit to Aknoor, a town on the right bank of the Chenaub, where it debouches from the mountains, I was attracted by the novelty

of a temple to Kam Deo or Cupid. The building, a recent obelisk, had fallen in, and the supposed statue of the deity had been removed into a modern Seebwala or Temple of Seeb close by, this temple being a facsimile of the most modern of the Mohammadan Tombs.

The figure is about 2 feet high, carved upon a dark stone (lime apparently) and in good preservation.—A sketch is enclosed. I was immediately struck with the outline of the club, as precisely similar to the club of the Grecian Hercules and entirely different from the mace of Hunnoomaun or the club of Hurr, the Indian Hercules. Its figure is graceful and the knots represent exactly in three touches of the chisel the stumps of branches roughly lopped away. All the rest of the figure appears to me rather Egyptian than Hindoo. The thick under lip, the teeth developed, the heavy ringlets falling upon either shoulder, the precision with which the perspective is preserved, and the minute development of every joint and member, so that even the finger nails are correctly chiselled. Unfortunately the head is broken away above the mouth; but from the impression left upon the stone it must have been unusually high. It appears to me to be a figure of Osiris in the joint capacity of Bacchus and Hercules. But, whatever it be, it is the indubitable original of the figures of Hunnoomaun, so common in upper India; that is, the peculiar bend of the body in this statue has been copied in the rude representations of the Monkey-God. The only drapery is the Hindoo dhotie, well and deeply cut. The most perplexing circumstance is the presence of the Junnoo or sacred thread worn by Brahmuns and Rajpootres. This is beautifully chiselled, but I was not aware that it was in use amongst the Egyptians. If not, it may have been added when their descendants had become naturalised in India. You are aware that there is a city upon the Indus bearing the name of Bacchus Lyah, and that Alexander met with the descendants of his followers upon that river. Although the club is so decided a facsimile of that of the Grecian Hercules, there is nothing else in the figure breathing of the Grecian chisel. The muscles are not developed. The hero has not been elevated by art into the character of a demi-god, but remains a clumsy mortal, and appears to be an imitation of the original, carried to a minuteness which distinguished the Egyptians, but which I have never observed in Hindoo sculpture. The left arm had been broken away so that I am uncertain whether the second left

arm belongs to this figure, or to another which has been grouped with it. The latter opinion seems more probable, as there is no articulation for a second arm upon the left shoulder, and no symptom of a second arm on the right. The second left hand presents a bunch of grapes or a custard-apple. The leaf accompanying is more like that of the latter fruit. It will be remembered that the custard-apple is to this day called Seeta-phul, (Seeta's fruit,) because she fed upon it whilst wandering in the woods. It is a native of the Dukhun. This second hand is beautifully sculptured. The foreshortening is perfect. This circumstance seems to strengthen the analogy between the Raam of India and the Raam of Egypt. Unfortunately the statue is still an object of worship, so that I could not make free with it. There is an ancient site close to Aknoor from which are dug the bricks of the present city. But all my endeavors to procure coins or relics were fruitless, and I doubt whether this image could have been found in its ruins, as the Indo-Greek empire seems to have been bounded eastward by the Jelum, and it is not probable that the Egyptians spread themselves farther eastward. On either side the mouth of the figure are horizontal lines apparently representing thin tufts of hair, as in some Chinese figures.

Additional Observations on the Damask Blade of Goojrat ; by the same.

A few observations suggest themselves in addition to the account I had lately the pleasure to send you, of the fabric of the Goojratie Damask. It appears to me upon second thoughts that the figure of the mass of cast steel may be selected by design, though probably hit upon originally by accident. For if we follow the arrangement of the needles of crystallization from the mass into the blade, we shall perceive that the edge of the latter is a serrated spine of these needles, radiating from the elongated ellipse into which the centre has been drawn. And as the power of swords, knives, razors, &c., to sever soft substances, depends upon the serration of their edge, we have here the finest and most perfect natural saw that can be imagined, justifying the half marvellous records of feats performed with Damascus blades.

This property being inherent in the structure of the crystallization is not liable to be effaced by accident or use. The acuteness of the wedge may be blunted, but the teeth of the saw cannot be destroyed.

That this arrangement of the crystals is not disturbed by the action of the hammer, we learn from the water of the blade and from the seam remaining inclosed in the back.

It follows that however perfect the edge of the natural damask may be, it must always be especially liable to cross fracture at that point where the radiation of the crystals is perpendicular to the edge of the blade. And accordingly Asiatics use such sabres with extreme caution, not ordinarily striking with them but drawing the edge lightly and swiftly over any unguarded part: a touch sufficing to disable; or severing their adversary's reins; a practice which renders necessary the use of chains upon the bridle to the distance of 18 inches from the bit.

The natural damask therefore seems ill-adapted to the purposes of war as practised by European nations, but seems especially suited to the fabric of razors, penknives and surgical instruments, in which keenness of edge is of the first consequence and elasticity of none.

The art of giving elasticity to the cast steel or natural damask is a secret known only to the discoverer, Col. Anosoff of Engineers, Master of the Fabric of Arms at Zlataoost. The knives, &c., warranted to be of cast steel, and professing considerable elasticity, which are common enough in England, are made of blistered steel, which bears that appellation amongst us, but is not bonâ fide cast steel, having never been in a state of fusion.



On the Local and Relative Geology of Singapore, including Notices of Sumatra, the Malay Peninsula, &c.—by J. R. LOGAN, Esq.

(Concluded from page 557.)

Extract from a letter to Professor Ansted, Vice-Secretary of the Geological Society of London, dated Malacca, 4th February, 1847.

“Subsequently to the date of the above paper, finding that but a slow and unsatisfactory progress could be made by land, I availed

myself of the natural vertical sections afforded by the shores of Singapore, and the smaller Islands, into which the southern extremity of the Peninsular range is broken, and was thus soon in possession of a body of facts which gave a certainty and consistency to the above views. I minutely examined the Islands of Púlo Brání, Blákan Mátí, Sikúkúr, and Sikíjáng on the one side, and Púlo Ubin, Púlo Tikong, Bæsár, Púlo Tikong Kechíl, Sejáhát Bæsár and Kechíl, &c. on the other side. I also explored the neighbouring coasts of the Peninsula, and the banks of the Johore river. The result was that I found the foregoing hypothesis, so far as it had been developed, to be substantially an expression of the facts. It had however given too much prominence to some modes of the volcanic or semi-volcanic action, and too little to others. Thus, although there has been a certain degree of eruption in some cases where the gases in forcing their way to the surface have excited an unusual mechanical force, their action has, in general, been limited to a partial reduction and metamorphosis of the rock in the zones or dykes through which they have passed up [or in those larger tracts beneath which the surface of the plutonic sea has risen to such high subterraneous levels that the whole superincumbent matter has been saturated by its exhalations. I have also noticed several facts which appear to require us to believe that some portions at least of Singapore, were under water at the time when the gaseous action first reached the surface. The vast abundance of hydrated peroxide of iron and the mode in which ancient ferruginated breccias and conglomerates sometimes occur, would be most simply explained by this hypothesis. The circumstances adverted to in the paper on this subject must be borne in mind. In some places a considerable quantity of matter derived from the hills has been deposited in the intervening valleys, probably at or soon after the time of elevation, and been subsequently covered up by modern sea mud on which mangroves have rooted and spread.]

The most difficult branch of the enquiry has been the relation between the volcanic action to which the sedimentary rocks have been subjected, and the crystalline rocks which are associated with them. But, disregarding this for the present, and considering the volcanic action apart from any hypothesis of its origin or its relations, and reasoning from its visible effects, we may lay down this position absolutely, that the whole region in question (and a much wider one, as it

will be found, extending to the lower ranges of the Himalayas, a large part of Australia, a part of Africa, &c.) has been exposed to a well marked and peculiar, perhaps a unique,* igneous action. It has varied in its intensity and mode of operation, but every where certain prevailing characters demonstrate its unity. These are both chemical and mechanical, the first depending principally on the never failing presence of iron, and the latter evinced by the extraordinary uniformity in the shapes, ramifications and even sizes of the ranges in which the rocks affected have been raised. Whatever be the nature of the original sedimentary strata, this mighty agent has impressed them with the same marks, and the more powerful its grasp has been the more have their native peculiarities been confounded. But between the effects of this intensest force and that so weak that we barely detect its touch, the degrees are almost infinite. Still the only way in which I can render this slight immethodical sketch at all intelligible, will be to note

* This I had been very slow to believe, because although there may be places where a fossil fauna or flora altogether peculiar is found, it is scarcely conceivable that any plutonic action should have an entirely local character, or that one repeated over so many parts of an extensive region in Asia, should not hitherto have been observed by Geologists in Europe or America. I have however, read nearly every English work on Geology without meeting a description of any considerable development of rocks in those quarters of the globe resembling our laterites, and have consequently been obliged to work out their true theory with little help from books, and by dint of patient and minute observation. A few months ago I was led to think that English writers were too much occupied in establishing their own opinions to present a full view of those of continental Geologists, and that the latter were leaving them behind in the science of rocks of injection, reduction and eruption. It appeared necessary therefore to gather their views from their own explanations of them. In the first work which I ordered, and which I received two days ago by the Overland mail, I found an allusion to a district in Europe, which has been described by an eminent French Geologist, and which, if I may judge from the few lines in which it is referred to, must be in many respects analogous to the lateritic tracts of the Malay Peninsula, and consequently of India, &c. also. In a few months I hope to have the means of ascertaining whether this is the fact, and also whether in the writings of other continental Geologists any similar tracts are noticed. A few days ago Mr. Balestier, put into my hands a letter which he had received from one of the gentlemen attached to the recent French Embassy to China, a pupil of the celebrated chemist Dumas, in which he explains the views of himself and another member of the embassy on the Geology of Singapore. His theory of the origin of the laterite had occurred to me when I first began to suspect its real nature. As my observations extended and became more minute, I found that such a theory only explained a small part of the phenomena, and that which I have now held for about 2 years, gradually developed itself, growing clearer and simpler in proportion as it embraced wider ranges of facts.—J. R. L. 16th March, 1847.

a few of the better marked disguises which the rocks assume under this potent influence. I say disguises, because the geology of the Malay Peninsula almost wholly resolves itself into the identification of the original rock under its multiplex transformations. Without a key to this, derived from a minute examination and comparison of the modes of alteration, the whole is a dark riddle, or our geology becomes a congeries of bewildered gropings and sheer mistakes.

The first or lowest degree of alteration, let us say in a clay, is the formation of isolated blotches of a reddish colour in the rock, but unaccompanied by any other apparent change.

2d. A slight comparative hardness in the blotches.

3rd. In addition a grittiness,—they may now be termed nodules or concretions, and we may include in this catalogue all degrees from an incipient grittiness to a hard compact character, which gives the nodule the appearance of an imbedded pebble; [the nodules are sometimes hard and compact without being gritty or quartzose, and they are gritty in their nascent state where the rock is originally arenaceous in any degree.]

4th. The nodules bulge out at different points, and the preceding three degrees may be repeated in nodules of this shape.

5th. The arms or branches unite so that the rock is pervaded by a complete congeries or ramification of red, rounded, but irregularly shaped, branches. The form of these branches varies very much, but is generally uniform for a considerable space. Very frequently it is as if ginger roots were continued in all directions. At other times the spaces between the ramifications are narrow sinuous perforations or isolated vesicles or deep straight tubes or chambers in tubes. This structure is sometimes the result of an allied or predisposing structure in the rock affected, and at other times, it appears to be wholly superinduced by the altering agency. In this last form the red portion is found of various degrees of hardness, but not so soft as the first degree. In general it possesses a medium degree of hardness so as to be cut with an axe.*

6th. In this class we may include the products all degrees of heat that has been suddenly applied in sufficient force to produce calcination, and this distinguishes it from all the preceding, in which the

* It hardens on free exposure to the atmosphere and is used in building.

rock has been merely impregnated with hot ferruginous gases or vapours—where the calcination has not been great the original structure of the rock is better preserved than in the merely impregnated rock, because, in the latter, the indurating action of the iron, the different degrees of its oxidation when it comes within the influence of water and air, and the washing out of the softer portions in the hollows, often give it an amygdaloidal or vesicular structure totally different from that of the original rock—a slight roasting on the other hand preserves the latter and saves it from meteoric destruction. The limit of this preserving power is soon reached, and every higher degree of heat and larger infusion of iron exerts in each rock, a corresponding destructive or altering power, and approaches nearer that point where the original differences in the rocks cease to be distinguishable. The extreme limits of this class appear to be where the rock is merely scorched on the surface, preserving its original character beneath, and where it is thoroughly reduced to a cinder. This class of rocks very frequently presents mamillated and botryoidal surfaces. It occurs in dykes, and on the sides of fissures through which hot blasts appear to have rushed. It also occurs in an outer layer or thick crust over rocks of the 5th class, in which case it would appear that the different effects produced by the same gas arose from the upper crust being exposed to the air and consequently burnt. In the same way the calcination to some depth on the sides of fissures may have arisen in certain cases, not from the gas that rushed through them being hotter than that in the body of the rock (though this was most likely the fact in general) but from the presence of air producing combustion. Between dykes of this last class rocks altered in the above 5th degree are common—but dykes of the 5th degree also occur. The difference in every case will depend on the relative intensity of the heat and degree of ferrugination of the gas, and the fact whether there was air to support combustion or not.

The preceding remarks are applicable chiefly to rocks either composed of clay or in which there is a basis of clay. But a very small proportion of clay suffices for the exhibition of the above modes of action. When the rock is wholly arenaceous, nodules are not formed. The rock is reduced to a dry incoherent or friable mass where the action has been slight. Where it has been greater, a net work of cracks

pervades the rocks, and the seams have either a thin plate of blackish ferruginous crust included between them, or their sides have a similar thin coating which is often covered with an exceedingly minute mammillation. In some cases the matter between the seams or ferruginous walls, has been dissipated, and the rock appears as a black honeycomb. In all instances of high calcination the sandstone is greatly indurated. It is sometimes converted into a crystalline rock.

Friable shales, again, are sometimes changed into a dry powdery matter resembling volcanic ash.

Where the bodies of the strata are not altered their planes of junction are sometimes slightly indurated and mamillated. The gas in every case has taken the readiest channels to the surface,—and where fissures have not assisted its emission, it has forced itself through the planes of least cohesion, such as the junction planes of different beds, cleavage planes, &c. It thus often exposes the internal structure of the rock where it would otherwise appear compact. The composition of the rock has often had a great influence in determining the channel of emission, so that its action sometimes is chiefly confined to one or more strata, the adjoining beds appearing to be little if at all affected.

Quartz frequently accompanies the ferruginous change, but rarely to a considerable extent.

The above are the most common modes of alteration, but there are others approaching nearer to true metamorphism. Clay is converted into a porcellainous or jaspideous substance,—sandstone into a hard siliceous flinty substance. Conglomerates and breccias have frequently a base of this nature.*

The mechanical force accompanying the evolution of the hot ferruginous gases or vapours has been great, but it has been exerted within narrow limits. Thus the strata are often vertical, and generally rise at high angles, but the dip varies much, and even in adjacent hills of the same connected range is sometimes reversed. Yet they are never raised more than a few hundred feet above the common basal level, and the majority of the almost innumerable hillocks which compose the ranges of Singapore, are probably rather under than above 100 feet.

* I have since found on the eastern coast of Pálo Krímún Kíchlí (the Little Carimon) great masses of clays and conglomerates transformed into a perfect crystalline chert as hard as flint.—J. R. L.

At the southern extremity of the western St. John's (Pálo Sikiang) two adjoining hills have been formed by strata being bent into a convex shape—rising only a few feet above the level of the beach. There is a remarkable approach to uniformity in the strike of all the strata and in the direction of the hill ranges. Speaking generally, it may be said to approximate to N. W.—S. E. The hills have commonly mamillary surfaces. The ranges may be said to consist of distinct hills bulging out and united at their sides. The central hills are generally the more bulky. Lateral hills ramify on each side to a short distance. The whole connected system is disposed in a symmetrical ramose manner, indicating a wonderful uniformity in the mode of operation of the dynamical forces which produced them. The investigation of the forms of these hills, and of the laws of the mechanical forces of which they are the result, assumes a high interest and importance when we find that these forms are not confined to Singapore, but are repeated in low hill ranges over large portions of the Peninsula, Sumatra, Southern India, Northern India, Northern Australia, &c., and accompanied, as I believe, by volcanic phenomena of exactly the same nature as those which I have described. I do not say that the phenomena are identical at all points. In Singapore itself they vary almost infinitely. But they are always analogous, frequently the same, and, to my mind, are undoubtedly the product of one well marked species of volcanic* action.

I should not omit to notice the frequent occurrence, in those ranges which have been most *burnt*, of mounds or monticules of scoreous blocks, sometimes on the summits, and sometimes bulging out from the sides of hills. The ridges and angles of hills appear frequently to present scoreous blocks.

The valleys between the long hill ranges are, in Singapore, perfectly flat, so that they display the outlines of the bases of the ranges almost as well as if they still remained what they were at no very remote

* In reference to the igneous changes which the rocks have undergone, I use the words volcanic and plutonic indiscriminately, because a minute examination of some of the best marked developments of crystalline rocks (graduating from basaltic to granitic types) at the extremity of the Peninsula, has led me to think that though the distinction is useful and appropriate in some regions, the theory which it expresses is not sound as a general one—at least as expounded by many Geologists.

period, long narrow inlets of the sea. This circumstance also is not confined to Singapore.

I will now briefly notice the nature of the sedimentary rocks which have been more or less altered and elevated in the modes I have mentioned. If you think it worth while, you can, I dare say, procure a copy of Mr. Thomson's Chart of Singapore straits from the Admiralty for reference. It would scarcely be advisable at present to attempt to make a geological map. The southern portion of the Island (including the town, the adjacent district to the N. W.; the ranges between the road from the town to Bukit Timáh, the central and highest hill, and the sea to the S. W.), and the Islands of Blakan Mátí, Púlo Brání, St. Johns, &c., are composed of shales, clays, sandstones and conglomerates, the shales predominating. It is impossible to refer these rocks to any place in your European systems, as no organic remains have yet been discovered, and the only rocks with which they are associated are hypogene. In their general appearance and mineralogical characters they agree with the aluminous and arenaceous beds of the new red sandstone. Between the parallel of strike passing through the town and the steep Tulloh Blangan range, there is an area about a mile in breadth, stretching from the sea inland over the Tanjong Pagar and Tanghir districts, and of course in a direction approaching to N. W., and in the opposite direction, including Púlo Brání and the eastern portion of Blakan Mátí, composed in great measure of shale strata, although a few of sandstone also occur. The prevailing colours of the shale beds are dull violet, liver brown and chocolate. Beds of the most lively variegated colours sometimes occur motled, striped, damasked, &c., the colours are white, yellow, orange, red, violet, purple, green, bluish and blackish, in addition to the dull violet and chocolate. To the N. E. of this tract sandstone is more frequently interstratified. To the S. W. sandstones, grits, and coarse conglomerates prevail; and these are continued, interstratified however with some shales, from the range along the coast of Tulloh Blangan through the western portion of Blakan Mátí, and through Sikúkúr and Sikijáng (St. Johns), in a S. Westerly zone. I have not yet pursued this zone further across the strait, but the Island of Sámbo, on the other side, is a continuation of the same parallel of elevation, and may consist of the same rocks. To the N. E. of the town, a large alluvial plain sweeps into the coun-

try. The hills around it are principally arenaceous. The arenaceous band however on the N. W. of the plain merely skirts it. Beyond this band (and succeeding the sandstone ranges to the N. E. of the shale tract first noticed) a broad zone of clayey hills, of which the boundaries are irregular, but which may be from 3 to 4 miles in breadth, stretches through the heart of the Island to Búkit Tímáh, and thence across to the Sálát Támboh or old strait of Singapore behind the Island. The tract to the S. W. of this, stretching from the parallel of the S. W. boundary of the shale band to the S. W. point of the Island (Tanjong Gúl), is composed principally of sandstone and shale, but granitic bases and ranges also occur. The great clay tract I believe to consist in large measure of decomposed hypogene rocks,—sienitic and granitic chiefly, (it has only however been partially examined or laid open). Blocks of these rocks are seen at the surface in some of the hills, and the sections made by roads so exactly resemble decomposed crystalline rocks that I have no doubt that the whole of the clay hills are at bottom hypogene rocks. Their structure and composition I believe to be very variable. This tract is continued over a considerable part of the rest of the Island to the N. E., but a large tract of sandstone (accompanied by a very little shale) stretches into it. The coast boundary of this tract is a line of about 4 miles, extending along the south eastern shore of the Island from Síglap to beyond Tánáh Merá Besár (the Red cliffs). It insulates the granitic N. E. projecting portion of the Island at Changy, embraces the northern coast from the inner extremity of this promontory to the inner extremity of that of Púngal, and then proceeds inland. The line of its junction on the N. W. with the granitic tract that surrounds it I have not yet ascertained, but it is probably irregular. On the S. W. it connects itself with the arenaceous band surrounding the plain previously mentioned, and, indeed, forms the larger portion of the boundary of the plain. It then stretches inland for some distance, having the S. E. projection of the great granite tract interposed between it and the arenaceous and shaley bands, first above noticed. P. Úbin is entirely hypogene, varying from granitic to compact types. Hornblende is largely developed. The structure of the rocks is highly curious and interesting. I have given much attention to this Island, and in the beginning of September last sent a full account of it, and of the geological views to which it

seemed to lead, to the Bataviaash Genootschap van Kunsten en Wetenschappen, in whose Transactions, the President writes me, it will appear. In this paper I had been led to some views with which I find Mr. Darwin had been occupied, and which are developed in the chapter on plutonic and metamorphic rocks in his geological observations on South America, of which, though bearing the same date as my paper, I did not receive a copy till about a fortnight ago. The germ of his ideas is however contained in his Volcanic Islands, which I have referred to in my paper. As I have also considered the subject from some other, and, as I believe, new points of view, I shall send you a copy of the paper in English, the Batavian Transactions being in Dutch.* The coast of the mainland behind P. Ubin consists of rocks some of which would be called plutonic and others volcanic like those of Pulo Ubin, but the whole are undoubtedly of the same contemporaneous origin. At Runto, in the estuary of the Johore River, sandstone, similar to that of the Singapore Red cliffs, and, like it, remarkable for being nearly horizontal, is exposed. Further up the River the rocks exposed are of a decomposed felspathic character, and exactly resemble some of those of the hypogene tract of Singapore. At one place a hard ferruginous crust about 9 inches thick overlaid a decomposed felspathic rock. Pulo Tikong, Besar and Kechil, consist chiefly of sandstones and in part of shales, often greatly altered by volcanic action. On the coast to the S. E. near Johore Hill, or at Tanjong Pingrang, are found, within a small compass, soft shale or clay,—clay indurated so as to resemble, or become, chert,—conglomerate highly indurated and partially transformed,—quartz rock,—and traces of blackish brown slags,—indicating various degrees, and even some difference in the mode of the volcanic action.

The connection between the crystalline and sedimentary rocks of the district is susceptible of two explanations. We may either consider

* In a general descriptive sketch of some portion of the Straits of Malacca which I sent to the Geographical Society some time ago, I mentioned the singular grooved rocks at the Chinese Quarries on P. Ubin, and hazarded some conjectures respecting their origin—when I wrote that paper I had made only one flying visit to the Quarries and was under the impression that the deep channels were confined to this locality. My first geological visit subsequently at once undeceived me. In the paper forwarded to the Batavian Society, I have *shewn* how these channels have resulted from the original structure of the rock under ordinary decomposing and eroding influences.

the former in their fluid or viscous state as having been the immediate agents of the volcanic and mechanical forces to which the latter have been subjected, or we may consider the former as the product of the first plutonic action beneath this region; the latter as sedimentary rocks subsequently accumulated [over them] during a period of quiescence, and their fracture, upheaval, and alteration as the effects of a new excitement to activity in the plutonic sea below, in which the old plutonic crust, with its sedimentary covering, was broken and upheaved, and ferruginous or ferro-siliceous gases copiously emitted through the lines of fracture. On either supposition the ferruginous character of the emissions would be accounted for, because the upper granites, &c. contain much iron in their hornblende, and whether the mass below the granite crust, had remained in its fluid state during the deposit of the sedimentary rocks, or had been wholly solidified and subsequently melted down anew, the gases given off from it, when vents were formed, would probably preserve the same character as those given off from its original surface before any granitic crust had been formed. I cannot stop now to explain how the prevailing plutonic theories, as applied to the phenomena of the district, seemed, at the time when the paper first mentioned was written, to require the adoption of the opinion that the granites, &c. were in existence when the volcanic action took place. Even under the influence of these theories I considered the point as very doubtful, and, although it involved consequences irreconcilable with these theories, I ventured to hazard the conjecture that the upper hypogene rocks had been the immediate agents of the changes. The examination of Pulo Ubin shook my faith in these theories as expounded by some of their principal advocates, and the conjecture assumed a high degree of probability. Latterly I had all but embraced it, but still suspended its complete adoption in the hope that I would discover some phenomenon amounting to ocular proof of its truth.

I have only another point to advert to before I come to Malacca. If you have taken any interest in Indian Geology, you are doubtless acquainted with the rock called laterite which prevails so largely in southern India, and is also found in Bengal, &c., and which, to this day, remains the most fertile subject of discord amongst Indian Geologists, although the general opinion appears of late to have settled down in favor of its being a sedimentary deposit. In the paper first alluded to in

this letter I made the following remarks with reference to laterite :—
 “Many of the clayey hills here [in Singapore] appear to me to be decomposed sienite, sometimes unaltered by supervening volcanic action, but generally partaking in the metamorphism which the matter of most of the elevated land has suffered from that cause.”

May I venture to suggest that the hypothesis which is developed in this paper for Singapore, might, if applied to the laterite of India, perhaps explain its origin, and, in doing so, to a certain extent also reconcile the conflicting opinions that have been maintained regarding it. All that I have read of the great laterite formations of the south of India, and which extend to the heart of Bengal, where they are described by Dr. Buchanan Hamilton, leads to the conclusion that they are not purely volcanic, sedimentary, or decomposed matter, but what I have termed semi-volcanic. The same formation is found at Malacca, and analogous deposits occur at Singapore, and both are inseparably associated, and evidently contemporaneous, with altered rocks of the kind previously noticed. If we conceive an area with trap, granite, sandstone, shale, &c. exposed at the surface, (in the atmosphere or in the sea,) and partly decomposed or disintegrated, to be subjected to a peculiar species of minor volcanic action like that which is described in this paper* (*the distinctive phenomenon, probably, of one and the same geological epoch*), the results would be, that with the occasional exception of matter ejected from no great depth, and some dykes and veins, the previous soft surface rocks would be merely altered and metamorphosed by heat and impregnated with iron, derived perhaps from the basaltic and other ferriferous rocks through which the discharged steam, gases and water had passed in their ascent. Whether the action took place under or above the sea would be determined by the presence or absence of the ordinary marks of oceanic denudation. When clays strongly ferruginous and soft from saturation with water, are dried, the iron previously held in solution by the water is deposited between the particles and cements them into a hard compact rock. Hence the

* Whether the upper plutonic rocks were the direct sources of the igneous action, or were themselves, together with the sedimentary rocks acted on by a lower plutonic sea, does not affect my explanation of the formation of laterites; for whether I adopt the one or the other view of *the source* of the injections and impregnations which produced the laterites, or remain in doubt on the subject, *the fact*, deduced from the actual examination of these rocks, that they have been so produced, is not at all rendered doubtful.

induration of laterite clays on exposure to the atmosphere." My opinion therefore was that though proper laterite was nothing more than one of the forms of alteration produced by plutonic ferruginous gases,—that which, in the arbitrary scale formerly given, I have called the 5th degree,—and that any rock in which a sufficient quantity of clay was present, whether it were purely sedimentary or a decomposed crystalline or compact rock, or whatever its origin or character in other respects was,—would, on being exposed to certain degrees of impregnation by such gases, and under the conditions before adverted to, become *laterised*. This opinion was abundantly confirmed by later observations, but these also proved that iron alone was capable of producing rocks of a lateritic form. The result therefore was that although proper laterite is produced in the mode which I have mentioned, yet that mode is not essential to the formation of a lateritic structure. The only essential thing is the diffusion of iron in ramifications throughout a clayey rock. Get the iron so diffused, and it is of little consequence by what door it was introduced. The only distinctive quality of proper laterite is that it has not merely got the iron, but has been, in various degrees, baked in the process of impregnation, and close examination can always discover traces of this. On the other hand, iron may be introduced by aqueous saturation, and if the soft rocks so saturated have planes of inferior cohesion, as many rocks have, the iron will there accumulate. If the iron solution pervade a homogeneous clayey rock as water does a sponge the segregating or concretionary quality of iron so diffused may gradually draw it into connected nodules or ramifications; and indeed it is probable that in all cases of volcanic gaseous impregnation of the compact parts of rocks the ferruginous matter remained for a time diffused throughout the rock, and that this segregating tendency subsequently superinduced its contraction into ramifications and blotches. Where the gaseous impregnation was weak, it would speedily draw into isolated blotches,—where stronger into isolated concretions,—where strongest, and the heat not too great, into ramifications. Again the iron may be laid up in the heart of a crystalline rock solidified from a plutonic fluid holding iron, and the essential condition for the production of the laterite structure may be found in decomposed hornblendic, or even black micaceous granites that have not been subjected to any supervening volcanic action. The oxidation

of iron solutions in clays on exposure to the air, and the combustion of rocks by heated ferruginous gas are chemically related, and the product of these two processes, geologically so widely sundered, is sometimes difficultly distinguishable by the eye. Ancient conglomeritic and brecciated laterites and ferruginous rocks, appear to have been formed in many localities at, or soon after, the period of the ferruginous emissions by fragments or pebbles settling down in a sandy or clayey base saturated with ferruginous water. Similar conglomerates, breccias and sandstones are at present forming along the coasts where the hills or banks above contain much iron; but all these are very obviously distinguishable from the original plutonically laterised sedimentary rocks.

When I visited Malacca about two years ago I had paid very little attention to these subjects and had not formed the preceding views. When an opportunity occurred at the beginning of last month of revisiting the place, I eagerly seized the occasion of testing these views in a new locality, and one which had been described by Geologists, such as Captain Newbold, and Dr. Ward, familiar with the much vexed laterites of southern India. Captain Newbold, in his work on the Straits describes the Malacca hills "as being generally of granite with the exception of a few near the sea coast, which are of laterite overlying the granite. Specimens of hornblende rock have been brought to me, he continues, from a hill a little south of Malacca—the islets on the coasts are of granite of various kinds, with white, red and green felspar. In all, the felspar appears to be predominant, and mica deficient." Dr. Ward says of the Malacca laterite—"In all its properties it agrees exactly with the rock common on the Malabar coast and described by Dr. Buchanan under the name of laterite." I was now therefore, for the first time, in a position to bring my theory to the strongest test, for I had not seen any specimen of Indian laterite, and could only compare some of the apparently analogous Singapore rocks with it from descriptions. Captain Newbold, in one of the latest of his numerous papers on the Geology of Southern India, describes very minutely the often mentioned laterite of Beder and makes some remarks on the long debated question of origin. He combats the idea that it is a contemporaneous rock associating with trap, or a product like trap of igneous fusion. He also casts doubt on the theory, advocated by several Geologists, of the laterite being "nothing more than the result of the recent disintegra-

tion of the granitic and trappean rocks *in situ*," and, without giving a decided opinion, says "the beds of lignite discovered by General Cullan and myself in the laterite of Malabar and Travancore and the deposits of petrified wood in the Red Hills of Pondichery, in a rock which, though differing in structure, I consider as identical in age with the laterite, and other facts too long for enumeration here, points rather to *its detrital origin like sandstone.*"* (*Journal of the Asiatic Society of Bengal, Vol. XIII. p. 995, 1844.*) Mr. Darwin, I may mention in passing, seems to lean to a similar opinion with respect to analogous rocks noticed by him. "The origin of these superficial beds," he says, "though sufficiently obscure, seems to be due to alluvial action on detritus abounding with iron." (*Volcanic Islands, p. 143.*)

The first lateritic locality which I visited on my arrival here was the Island of Púlo Upœ, from which much laterite has been removed for building purposes, and where it continues to be cut. The first fragment which I knocked off the rock at once satisfied me that my theory was correct. It was a rock totally different in its original character from any which I have found at the southern extremity of the Peninsula, but which, by the same agency that altered the ordinary sedimentary rocks there, had been transformed from a common argillo-micaceous schist into a rock undistinguishable, save on minute inspection, and, where the alteration has been great, absolutely undistinguishable from some of the altered sedimentary shales and clays of Singapore. Upon careful examination I found, as I expected, in the sections afforded by the coast of this little islet, the original unaltered micaceous rock with great bands or dykes and overlying masses, exhibiting abundant varieties of transformation from a rock slightly discoloured by the ferruginous action through several lateritic types, to the calcined slaggy form in which the original composition and structure are wholly obliterated. I cannot enter into further particulars. My subsequent examination of about fifty miles of the coast from Púlo Arang Arang (P. Arram) southward, and of a portion of the interior of Malacca, has proved that the whole of this region has been originally composed in a great measure of the same argillo-micaceous schist. I shall hereafter give

* I have read all Captain Newbold's papers with the attention which they deserve, and I think every fact which he notices in his notes on laterite tracts is reconcilable with the theory which I maintain.

its numerological characters, for I have not time nor means at present to ascertain them carefully. It is soft and glistening like silk, and leaves a powder on the fingers which exactly resembles in appearance the fine glistening powdery down from a butterfly's wing. In some cases it is less dry and more argillaceous. With the exception of Cape Rachado* it has almost everywhere been more or less penetrated in bands (and broad spaces occasionally) by ferruginous gas which has transformed it into one or other of the forms before described or some intermediate forms. Dykes and veins of pure quartz and of quartz with numerous fissures filled with an iron crust are frequent in some localities, while in others they are wanting. Wherever these dykes and veins occur the foliation of the schist is much contorted. In some localities the surface is covered with black shining mamillated scoreous blocks passing down into a lateritic mass, in which the schist is often not greatly altered but is penetrated by ramifying dykes and veins of a ferruginous, quartzose, or quartzo-ferruginous character. Isolated pseudo-crystals and isolated plates of quartz occur in the schist in some places, and, on the other hand, patches of the schist are found in the hearts of large pieces of quartz. But it would require other 20 pages to give even an outline of the varied and irregular manner in which the rock has been altered. If we did not every where come upon portions of the original rock unaltered, or find traces of it in the altered tracts, it would be almost impossible to believe that all the varieties of the latter have had a common origin. I must briefly allude to Cape Rachado. This is a bolder and higher range than any found elsewhere along the coast and projects far into the Straits. It is the only locality which I have yet seen where the quartzose has predominated over the ferruginous action of the plutonic gases. The rock every where exhibits unequivocal evidence of its having been originally the same argillo-micaceous schist which prevails over the rest of the region. In some places the cliffs are almost wholly quartzose,—in others the rock is a congeries of quartz veins and foliæ,—in others the seams between the quartz foliæ have a coating of the original mica,—in others the original mica predominates and the quartz is more sparingly scattered through it. Broad dykes of compact quartz, of quartz mixed with a ferruginous crust, of numerous parallel veins with quartz crystals springing from

* Where the plutonic action has been of a silicifying more than a ferruginating nature.

their sides and the interstices filled with a black ferruginous substance sometimes dull and sometimes shining (apparently hydrated oxide of iron) and of quartz holding a similar substance in seams also occur. One of the largest and boldest cliffs has been converted into a compact siliceous rock pervaded by numerous quartzose and ferruginous dykes and veins. In some places a complete net-work of fissures ramifies through the rock, and it is evident that quartzo-ferruginous gas or vapour has been injected through these fissures and the large veins and dykes, and metamorphosed the rock.

At the Water Islands south of Malacca, and at Tanjong Panchur and Budewa to the north, I carefully examined some large developments of granitic rocks. In the former I found some dykes composed of quartz felspar and a ferruginous substance similar to that already noticed. In decomposed felspar and also in solid quartz in those dykes I found much both of decomposed and of undecomposed iron pyrites. Although these dykes seem to countenance the idea that the plutonic agency which has so greatly affected the superior rocks was exerted after the formation of the upper granite, I have from all my observations come to a different conclusion. I cannot now state its grounds, and I do not positively bind myself to an opinion to which perhaps I cannot demonstrate beyond doubt to be correct, but the result of my constant consideration of the subject in all its relations, and with reference to every new locality that I have explored, is as follows:—The whole region has been subjected to plutonic reduction. The plutonic fluid by its pressure has caused fractures in N. W. S. E. lines, and it has swollen up in ramifying bands having that general direction. Its pressure and heat have varied at different portions of its surface. In some places the heat has been so intense as to reduce all the superincumbent rock up to the very surface into its own substance, and it has swollen up into mountains in the interior and hills in the exterior lateritic tracts of the Peninsula.*

* This is opposed to prevalent theory, and it may be asked whether in that case it would not have flowed over? But I have found it impossible to apply the prevalent plutonic theory,—I mean that of a necessarily *Tartarean* origin of granite, &c.,—to the granites of the south of the Peninsula, considered even *per-se*, and I would ask in return whether there is any proof or probability that granite prior to solidification ever exists in the upper crust of the globe in any other form than as a viscid cohesive mass. Let Fig. 1, Pl. XXII. be the surface of a plutonic bubble swelling up and reducing

The transformed and partially transformed sedimentary hill ranges rest, I conceive, upon granitic bubbles* where the plutonic action has been less intense. The fissures and cracks formed by the pressure of these bubbles have been the channels, the gases given off from their surface the immediate agents, of all the alterations. The tracts where only granite now appears swelling above the surface had previously passed through the same stages. In other words laterite is one of the earliest stages in the reduction of the upper rocks superincumbent on a plutonic sea into the substance of which that sea is composed. Where the heat has been least intense, the upper rocks have merely been raised,—where greater, lateritic, scoreous, and other partially altered, hill ranges, have been produced. A higher degree of plutonic action has produced quartzo-ferruginous ranges like that of Cape Rachado. The highest degree has transformed or reduced the whole into granite and allied crystalline rocks, from the mode in which the granites, &c. come to the surface at Singapore, we see that the whole region there has been broken up by the plutonic sea below. I can proceed no further however at present, and must close this rough draught of my ideas.

the superincumbent rock as well as upraising and fracturing it. A great fissure would probably be produced when it reached a certain nearness to the surface. As it slowly pressed up it would appear as in (fig. 2), but as it became exposed to the atmosphere, it would have an increased tendency to solidify at the surface, and as it rose above the level of *a d*, (fig. 3), it might already have a semi-solid shell sufficient to prevent the already *thickening* mass within from swelling out laterally over the surfaces *ab*, *cd*; but suppose it was sufficiently viscid to do so, the consequence would be that the spaces *oo* (fig. 4), would be exposed to an intense heat on two sides and be reduced in a more or less crystalline form to a portion of the bubble. I believe that granitic bubbles always swell up with exceeding slowness, and that the centre of the bubble (if its base be of great size) may remain for centuries, or even longer, in a viscid state, while a thick solid crust of granite has formed on the sides and summit, and that the central part will still exert as slow upward and outward pressure as it solidifies, and may itself be subject to a long continued elevatory pressure from the sea below. In other words the summits of granitic mountains and minor masses may go on rising above the base, after the latter with the whole surface has solidified, and when the base has no further upraised movement save what it may possess in common with the plutonic sea below. Great dislocations in the upper crust must necessarily result, but does not every plutonic mountain range bear witness to such dislocations? I must refer to my paper on Pálo U'bin for the facts on which these veins are based.

* I do not mean that each base or hill range has a corresponding protuberance on the surface of the plutonic base, but that the whole system of hills and hillocks has been produced by inequalities in that surface and by the directions which the principal and divergent lines of fracture have taken.

*On Various Genera of the Ruminants, by B. H. HODGSON, Esq.,
Dorjeeling.*

That there are more false facts than false theories in science is the profound remark of an eminent philosopher, and a remark which it is peculiarly incumbent on the real student of Nature heedfully to bear in mind in relation to Mammals, because genuine wild specimens exhibiting the mature and characteristic marks of their species are to be had but rarely and accidentally (owing to the progress of cultivation in all but utterly savage lands) ; whence has resulted almost necessarily a host of descriptions which, being drawn from very imperfect materials, are inadequate to fix the species, and a host of generalizations which, being deduced from such descriptions, are, of course, imperfect as generic designations.

Such imperfect descriptions of species, and consequent defective (by omission and error) designations of them when thrown into classes or groups, are to be found in works of the highest authority ; and, though the causes of these short comings are obvious and not wholly matter* of reproach to our eminent guides in Zoology, yet is it very desirable now and then to caution the *ordinary observer* against them, lest implicit reliance upon high authority should cause his attention to slumber or somnambulize when it is of the utmost importance that that attention should be wide awake and directed towards all the points to be observed ; for, the phænomena being as *scattered* as they are numerous, and capable of being adequately noted only at *the time* and *place* of their *rare and lucky* occurrence, it is the one thing needful to the sound progress of the science whose business is with such phænomena (the structures and the habits of wild animals) that alert observers should exist *every where*, in order that the rare occasions of observation be not lost.

* Not so in so far as the phænomena are casual, rare, and eminently dependant on time and place and lucky accident for means of adequate observation—but really so in so far as these persons have taken no measures whatever to enable those whose positions are favourable to the observation of such phænomena to make the right use of their unique opportunities. This is the opprobrium of Zoological Societies, and a most grave one it is, though one from which many of the most eminent writers on Zoology are free, as having nothing to do with Societies.

I am fully of Cuvier's opinion that we are now 100 years too soon for the possible tracing of the filum arcadneum of Nature, and consequently that the dry skin and inference system of the closet—which ambitiously seeks to work out an impossible problem by means the most inadequate and unfit, instead of supplying guidance to the only persons who are in a position to complete the necessary preliminary observations of the phenomena thus prematurely sought to be generalized—is a mistake and a grievous one. But, though I hold that all present attempts at a general *Systema Naturæ* are folly, and that the true business of the master of Library and Museum in the present infantine state of the science is, to quicken and guide the observing powers of the field naturalist and to thus multiply infinitely the chances of effective observation of phenomena which are necessarily as scattered in the place, as uncertain in the time of their occurrence, yet have I no intention to underrate the value of subordinate Zoological aggregations or classings of animals into minor groups or genera, in the light of *helps to memory and guides to observation*.* On the contrary, I am most fully aware of the importance of all such classifications in this light, and especially with reference to the material end of quickening and directing *ordinary observation*; and what I regret is that no pains are bestowed in the proper quarter to draw up and disseminate any such directions. Let such a 'how to observe' be framed for each country where observation is still needful; let it exhibit side by side the popular and scientific names of the chief groups of animals in such country; and let each group have appended to it a distinct enumeration of the actual or supposed essential characters of such group, in other words, of the points that ought to be observed in regard to each group, whether for verification or augmentation; and in ten years Zoology will make more real progress than under the continuance of the present system it can do in a century!

The characters of the several groups of animals proper to any given country are now only to be had peicemeal in numerous costly works wherein hardly any one has time or means to seek them; and they exist there, moreover, overlaid with a deal of the leather and prunella of cumbersome useless lore. Let the characters of groups be brought

* Such guides will always tend more and more towards the natural system, and the best will still be those which least conflict with it.

together in a cheap form, and stript of their buckram, and numberless men of sense and education will be found ready to apply them to their *only true use* in the examination of such wild animals as chance may throw into their way, though such men may be slow, as heretofore, to toil blindly for the convenience of others who ought to, but do not, seek to give interest and effect to their independant researches. Such a guide to ordinary observation is the one thing needful in order to interest men of sense in the matter. Let the means and ends, the structure and the habit, the organ and its use, be thus juxtaposed, and intelligent curiosity will soon be generally turned towards this wonderful system of adaptations, emanating from omniscience. Nor does it materially signify that all the indications of a genus or group of animals be accurate. Only let all of them be set down, some in the shape of queries, and observation under favourable circumstances, that is of the fresh and perfect animal, not of its mere skin, will soon determine the fitness or reality of all such negative or positive marks of a group of animals as are supposed to belong to it. Structures and manners are the two heads under which the directions I advert to should fall. Let the 'what to observe' upon each of these two points be separately set down and applied to the several distinct lots or assortments of animals proper to the country, and there will be forthwith a general and unlooked for effort to fill up the Zoological desiderata! I pretend not in the present paper fully to exemplify my own precepts as above given; nor have I the appliances requisite to the performance of the entire work suggested. That work must emanate from the public Museum and Library, and ought long since to have emanated from them, as their appropriate and best (infinitely best) fruit and repayment of the general contribution. For, where the phænomena to be ascertained are those of rare and secluded animals, where the real objects of study are *vital* organs and their uses, let me ask any man of sense if there be any limit to the superiority of a system which should qualify the only persons in situations to note such phænomena over the system which practically leaves such a work wholly to half a dozen men shut up in cities, though they are obliged to perform it by means so inadequate as skins, eked out now and then by bones? This is a question well worthy of the consideration of Zoological Societies. My present purpose is to add my mite in the way of popularizing and

completing the indication of genera among the Deer, Antelopes, Goats and Sheep, grounding upon H. Smith and W. Ogilby, whose researches into the essential structure of these groups of animals may be seen in the *Règne Animal*, English edition of Griffith, Vols. IV. and V. and in the *Zoological Journal* for December 1836, and *Penny Magazine*, article Antelope: to which add Mr. Gray on the Musk family, *Zoological Journal* for June 1836. Referring, then, the critical reader to the characters of groups as furnished by these writings, I proceed to exhibit the following amended and additional indications, as the results of several years' observation of nature, and as what I believe will, even if occasionally found inaccurate, tend to quicken and guide the observation of my brethren of the services who are scattered over those wildernesses of this vast land wherein only (or in the vicinity of which) its wild animals can be looked for, or adequately examined, (for they will not keep or carry), and who may be disposed to use their *unique opportunities* for the advancement of a knowledge of God's works, the meanest of which is a miracle of contrivance. We pause over a Watt's steam-engine, how much more should we pause over self-acting machines which support life and wed matter and spirit!

CERVIDÆ.

Mrigádi. Haranádi.*

Hoofs cloven. Postcal plane of scull forming an obtuse angle with frontal plane. Horns solid, falling annually, proper to males only, (save Rein Deer) inserted, superiorly and proximally, below the frontal crest. Front teeth in the lower jaw 8. None above; Canines normal and constant, found in both sexes, or in the males only. Molars $\frac{6}{6}$. Muffle normal and constant (save only in Rein Deer and Elk). Teats 4, normally and constantly. Eye-pits constant. Groin pits vaguely defined or wanting. Feet-pits usually present, in all 4 feet, or only in the *hind*.

1. Genus CERVUS. Stags.
Mriga. Haran.

Horns in males only, much branched, 2 basal, one central, and several terminal, snags.

* The Sanscrit postfix adi, meaning et cætera, is the probable etymon, and certain equivalent of the Latin idæ and inæ.

Muffle* large, covering the front of upper lip.
 Eye-pits moderate and moderately mobile. S-shaped.
 Feet-pits large in all 4? feet.
 Groin-pits none.
 Calcic gland and tuft posterior and external.
 Teats four.
 Canines in males only.

Types, *Cervus elaphus* of Europe. 2, *Cervus affinis* of Saul forest or Múl Bárah Sinha, and 3, *Giána* or *Cervus wallichii* of Tibet. These animals are further characterised by a very short tail, a large disc or pale space round the tail, and no proper mane. The Indian ones are confined to vast primitive forests on the plain. I have no notes of their intestines, or breeding.

2. GENUS *RUCERVUS*.
 Baraiya or Bárah Sinha.

Horns in males only, with one basal snag and no central one, but their summits many-branched as in the true Stags or *Elaphus*.

Muffle large, covering front of upper lip.
 Eye-pits moderate, mobile moderately.
 Feet-pits?
 Groin-pits none.
 Calcic gland and tuft?
 Teats four.
 Canines in males only.

Type, *Cervus elaphoides vel du vaucelli*.

This is the Baraiya or Bárah Sinha. It inhabits reedy marshes and islands of great rivers along the whole Eastern and Northern skirt of Bengal and Hindosthan. Never enters the mountains or forests. Herds enormous in the Islands of the Brahmaputra. These animals are further distinguished, like the true stags, by the absence of the heavy mane of the *Rusas*, and by a short tail which however has no true caudal disc and is longer than in the Stags proper?

3. GENUS *PROCERVUS*.
 Gorr or Gower and Ghós.

Horns in males only, small, smooth, greatly divergent, and much bent in the beam, like *Bos*, and furnished with only one? snag which is basal and forward. Another subterminal?

* See N. B. at end for explanation of all these organs.

Eye-pits medial, vertical.

Feet-pits none.

Groin-pits none.

No calcic tuft nor gland?

Teats four.

Tushes in males only?

Type *Cervus dimorphé*. The Gouñ or Ghós.

Habitat Saul forest.

Further subordinate marks of this genus are—

Tail short. No caudal disc. A mane.

The Gowers are not gregarious. They are confined to the Saul forest so far as appears. With their rutting season and gestation I am unacquainted. Intestines 56 feet. Small 29, great 27. Cæcum 19 inches by 4. Diameter of small gut $\frac{3}{4}$ inch. Liver 3-lobed and a lobulus. Lungs 4-lobed. Gall-bladder.

4. Genus *RUSA*.

Sámber, Jarai (vulgo Jerrow).

Horns in males only, trifurcate: 1 basal and 1 subterminal snag. No central one.

Muffle large, covering the front of upper lip.

Eye-pits very large and completely reversile.

Feet-pits large in all 4 feet.

Groin-pits none.

Calcic gland and tuft, posterior and external.

Teats four.

Canines in both sexes.

Type, *Hippelaphus* or the Sámber, and *Aristolelis* or the Jarai: both continental species of India.

Also, in the Islands, *Equinus*, *Peronii*, *Etam*, and *Mariannus*: but they want testing, all of them.

Habitat, all the great forests of India and of its islands, and to a certain extent, the mountains above them, where the other large Deer are never seen.

These animals are not gregarious: they have a long bluff tail like that of a docked horse; no disc round it; but a heavy mane over the whole neck.

One anomalous species thence called *Heterocerus* has no upper snag to its horns.* The *Rusas* rut in spring and then drop their horns.

* Another large Deer of the Indo-chinese ranges of Hills is *Panolia Eedii*, the *Cervus Frontalis* of Mr. McClelland. Not found West of the Brahmaputra.

Their females gestate 8 months and produce young in winter, occasionally so early as the end of October, and one at a birth. In confinement the horns are usually dropt in April and take six months for their perfect replacement. The horns are not complete in form till the 4th year nor in size till the 8th year. Small gut 52 feet. Large

31. Cæcum 15 inches by $4\frac{1}{4}$.

5. Genus *Axis*.

Chittal. Chittra-chittri.

Horns in males only, with one basal and one subterminal snag, as in Rusa, but the beam more bent and the horns paler and smoother, and closer grained in structure.

Mufle large, covering front of upper lip.

Eye-pits large, very mobile.

Feet-pits large, in hind feet only.

Groin gland large; sinus vague.

Calcic gland and tuft, postcal and external.

Teats four.

Canines in males only.

Types, 1, *Axis major vel maculata vel nudipalpebra*, or common spotted Deer or Chittal. 2, *Axis*; medius or lesser spotted Deer or Jhow Laghuna. 3, *Axis porcinus vel niger*, or Hog Deer, or Pára, or Khar Laghuna, or Súgoria.

Habitat, general over the plains of India, whence the progress of cultivation has long since driven the larger Deer or Bárah Sinhas and Rusas and Gowers (recte Goñr). These animals have a smooth, generally spotted, coat, no mane, and a long tail reaching to the hock and ending in a point. It is singular that H. Smith should question their having eye-pits and canine teeth.

The Spotted Deer are gregarious, the herds being often very large: the Hog Deer are less so, dwelling more in families. Their breeding season is May, June: their rutting season, December, January. They gestate 6 months. Intestines of lesser spotted species $65\frac{1}{2}$ feet, whereof the small are 40 and the great $25\frac{1}{2}$. Cæcum $9\frac{1}{2}$ inches by $3\frac{1}{4}$, and 5 inches of gut below it, of same calibre; rest equal and narrow. Intestines of Hog Deer $41\frac{1}{2}$ feet, whereof the lesser are $24\frac{1}{2}$ and the larger $16\frac{3}{4}$. Cæcum $8\frac{1}{2}$ inches by $2\frac{3}{4}$. They rut and breed like the spotted species.

6. Genus *STYLOCERUS* or Stilthorn or Muntjac.
Dária-Mriga. Ratwa, Káker.

Horns in males only, small, raised on high hairy pedicles, and having only one snag which is basal.

Females with bristley tufts ending in knobs instead of horns.
Eye-pits very large and extremely mobile.

Facial creases, large, mobile, glandular, placed along inner side of horn pedicles towards their very forward salient bases.

Feet-pits large, in hind feet only.

No groin-pits.

Mammæ four.

Canines in males only? large, trenchant, and exerted, as in the Musks.

No calcic gland nor tuft.

Types 1 sp. *Vaginalis* or the Kijang of Indian Islands.

2 sp. Ratwa or the Káker of Indian Continent.

Habitat, general in Indian mountains and in forests at their bases. Never elsewhere. Seldom seen above 7000 feet in the Sub-Himalayas.

The Muntjacs are not gregarious though 6 or 8 are occasionally found together. They prefer the dells to the tops, and the close to the open cover. Copse or brushwood of the Chinese bambú is a favourite retreat. They bark all the year but particularly in winter when the males are wanton. January, February is the common rutting, and June, July the common breeding season: the gestation being of 6 months; but they breed occasionally at any season though only once a year, and have one or two young at a birth.

The male's horns fall in May and are perfect again in August. Intestines: male 61 feet; whereof the small are 44 and large 17 feet. Cæcum 15 inches by $2\frac{1}{4}$, and 9 inches of gut below it of same size. Rest, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide. Intestines; female, 49 feet; whereof small 34 feet and great 15. Cæcum 12 inches by 2, 12 inches of gut below it of like diameter.

MOSCHIDÆ. THE MUSKS.

Kasturádi. Múshkádi.*

Feet cloven: no horns: front teeth 8 below, none above. Molar

* See note in p. 688.

teeth $\frac{6}{6}:\frac{6}{6}$. Canines large. Cranium Cervine with the two planes gradually blended.

7. Genus MOSCHUS. Kastura, Múskhi-Haran.

Muffle large, as in Deer.

No eye-pits.

No feet-pits.

Large caudal gland with lateral pores.

No inguinal pits.

Calcic tuft and gland external and postea.

Large preputial gland and sac secreting the substance called musk, proper to males only.

Teats four.

False hoofs very large, acute, and touching the ground.

Canines in both sexes: of males, large and exerted; of females, small.

Types, 1, Moschiferus. 2, Chrysogaster. 3, Leucogaster.

Inhabit the great snowy mountain barriers of high Asia from the Himalaya to the Altai, and from the Beluttag to the Peling and Gajar. The Musks are confined to the snowy region amid the glassy precipices of which they leap with a power and security far more than Caprine, though owing to the unequal length of their legs they can descend slopes only with difficulty and falling are caught. They cannot climb at all, as Goats do, and are solitary. They rut in winter and produce young in summer (May-June), gestating 160 days. In 6 weeks the young can shift for themselves and the mother drives them off. They can procreate ere they are a year old, and live 10 to 15 years. One usually is produced at a birth in the cavities of the rocks. Intestines 33 to 36 feet, whereof the small are 23 to 24, and the great 10 to 12 feet. Cæcum simple, 8 to 9 inches by 1; mean diameter of gut 1 inch. Gall bladder* constant. (See Journal, Nos. 87 and 118, and Gleanings, No. 34.)

8. Genus MEMINNA. Pisora, Pisé.

Muffle large.

No eye-pits.

No feet-pits.

No groin-pits.

Calcic gland nude and external.

* Prof. Owen doubts this. I have tested it a dozen of times since Dr. Campbell and I made the first examination in Nepaul.

No preputial bag.

Four teats.

False hoofs, ordinary, small.

Canines not exerted, and confined to males?

Type, *Meminna Indica*. *Pisora* and *Pisai*.

Inhabits the forests of India in all parts, near to, but without the various ranges of Hills.

CAVICORNICE MINORES.

Lesser hollow-horned Ruminants or Flocks.

Hoofs cloven. Occipital plane of skull forming a small or large angle with frontal plane. Horns hollow, sheathed, persistent, with thin and dense, or thick and porous cores. Mufle small, for the most part, or wanting. Front teeth 8 below. None above. Canines present or absent. Molars $\frac{6}{6}$ or $\frac{5}{5}$. Teats 4 or 2. Eye, feet, and groin, pits, present or absent.

ANTELOPIDÆ.

Antelope kind.

Sásinádi.

Occipital plane of skull forming an obtuse angle with the frontal plane. Core of the horns thin, consisting of dense bone often with a clear sinus at the base within. Horns seated on the superior surface, below the crest of the frontals, and apart at bases. Canines frequent. Mufle present or absent. Teats normally 4 or 2. Feet-pits in all 4 feet or only in the hind ones.

Eye-pits present or absent. Groin-pits present or absent.

N. B. These animals have also occasionally maxillary, intermaxillary and post-orbital sinuses, the number and high development of these organs being one decided characteristic of the Family.

9. Genus *TETRACERUS*.

Chousinha. *Chouka*.

Horns in males only, four in number. Two inter-orbital; and two behind eyes, but below crest of forehead.

Mufle large, as in Deer.

Eye-pits medial, linear, longitudinal.

Feet-pits in hind limbs only, or none.

No inguinal pits.

No calcic tuft or gland.

Teats four? two?

Canines in the males.

Types, 1, Chikara. 2, Quadricornis. 3, Subquadricornutus. 4, Iodes. 5, Paccerois. (See Calcutta Journal Natural History for May, 1847.)

Inhabit the forests of India generally. Avoid mountains and open plains. Not gregarious. Rutting season, summer. Breeding season, winter. Gestate 6 months, most young born in January, February. They are very shy, and when hunted lie close or go off far ahead, bounding like the common antelope, and hence one of their names, from Chouk, a leap.

10. Genus ANTELOPE.

Antelopes Proper.

Sásin.

Horns in males only.

No muffle.

Eye-pits, medial, very mobile, linear, vertically oblique.

Feet-pits large in all 4 ? feet.

Inguinal pits large and clearly defined.

Calcic tufts ?

Mammæ two.

Type, Cervicapra. Black Antelope. Báránt and Sásin. Very gregarious on the open dry plains of India generally. I have no notes of their intestines or of the breeding.

11. Genus GAZELLA.

Ghazal.

Horns in both sexes.

No muffle.

Eye-pits distinct, mobile.

Feet-pits very large in all 4 extremities.

Inguinal pits large and distinct.

Calcic tufts ?

Mammæ two.

Type Dorcas. Foreign to India.

12. Genus TRAGOPS. (*τραγος* et *ωψ*.)

Chikara, Kálsipi.

Horns in both sexes.

No muffle.

No eye-pits.

Feet-pits large in all 4 feet.

Inguinal pits distinct.

Calcic tufts postæal.

Mammæ two.

Type, Antelope beemetti vel christii, found generally amid ravines of dry plains of India, and called Chikara and Kalsipi by natives ; Ravine Deer by Europeans. Not gregarious.

These animals have the lyrate horns common to both sexes, the knee tufts, lines along the flanks and ovine hairy nose of the Gazelles: but they are wholly void of eye-pits. The dark lustre of their large* eyes is as striking as in the 2 last groups. Gazelles differ from Antelopes in that their horns are lyrate, and that the females also carry them. The Tragops differ from both by the total absence of sub-orbital sinuses, or eye-pits.

13. Genus *PANTHOLOPS*.

Chirú.

Molar teeth $\frac{5}{5}$.

Horns in males only.

No muffle.

No eye-pits.

Feet-pits large in all 4 feet.

Inguinal sacs, purse-like, large, pendent.

Calcic tufts?

Mammæ, two.

Large intermaxillary sacs like double nostrils.

Type, Antelope *hodgsonii*, Abel. The Chirú.

Habitat open plains of Tibet. Gregarious, rutting season, winter. Breeding season, the summer. Gestate 6 months. One young at a birth. They are very pugnacious and jealous, and in their contests often break off their long horns one of them. Hence the rumour of Unicorns in Tibet. (See Gleanings and Journal Asiatic Society, Nos. 2 and 27.)

14. Genus *PROCAPRA*.

Goa and Ragoa.

Horns in males only.

No muffle.

No eye-pits.

Feet-pits small in all 4 feet.

Post cornual sinus, large.

No inguinal pores.

Calcic tufts postæal.

Mammæ two.

Type *P. picticaudata*. Goa of Tibet.

* This is one of the marks by which the Antelopine family may be distinguished from the small pale-eyed Goats or Caprine family.

Inhabits ravines on the open plains of Tibet in small herds or families. See Journal Asiatic Society, No. 173.

15. Genus *KEMAS*.
 Goral.
 Horns in both sexes.
 Mufle medial.
 No eye-pits.
 Feet-pits medial in all 4 feet.
 No groin-pits.
 Calcic tufts?
 Mammæ four.

Type, Antelope Goral. - The Goral. Habitat the Sub-Himalayas as far towards the snows as the great forests extend, to which exclusively these animals adhere. Dwell in families 4—6 together. Breed amid crags and rocky recesses. Young mostly born in May, June: gestate 6 months. Rutting season January, February. Produce one young at a birth.

16. Genus *NEMORHÆDUS*.
 Vel Capricornis.*
 Thár or Saraw.
 Horns in both sexes.
 Mufle medial.
 Eye-pits round and furnished with a very large gland.
 Feet-pits extremely large in all 4 feet.
 Groin pits none.
 Calcic tufts none, nor gland.
 Mammæ four.

Type, Antelope thár. The Thár or Saraw.

Habitat the Sub-Himalayas as far north as the great forests extend.

Also, Antelope Sumatrensis of the Islands of India.

The Gorals and Thárs have the round black and ringed horns of Antelopes, which otherwise they little resemble, being stout clambering mountain animals, but not, as supposed, affined to the Bovines. The Gorals differ from the Thárs by wanting the very glandulous eye-pits of the latter, and both are sundered from the Hemitragas by their large

* Sumatrensis is Col. Smith's type, and Mr. Ogilby says this is identical in structure with the Thar, Mr. O.'s. type of Capricornis. If so, Col. Smith's generic name will have the priority; if not, it will be the type of Nemorhedus and the Thar of Capricornis. Col. Smith's several species of Nemorhedus are as heterogeneous as Mr. Ogilby's of Kemas.

feet-pits, Antelopine horns, and absence of Caprine odour. The Thárs are not gregarious at all. They rush with fearful precipitancy down the steep mountains they inhabit. Rutting season, February, March. Young (one) born in September, October. Gestate 8 months. Small gut 65 feet. Great 32 feet. Cœcum 15 inches long by 3 wide, and simple. Gall-bladder constant. (See Journal No. 45 for Sept. 1835.)

CAPRIDÆ.

Goats and sheep.

Bakarádi.

Occipital plane of skull forming an acute angle with frontal plane. Cores of horns thick, porous and cellular. Horns seated superiorly on the crest of the forehead and by their union covering the top of the head. Canines wanting. Teats normally but two, rarely 4. Mufle abnormal and almost invariably absent. Feet-pits in all four feet or only in the fore-feet, or none. Eye and groin pits present or absent.

17. Genus *HEMITRAGUS*.

Jhárál vel Tehr.

A small mufle.

No eye-pits.

No feet-pits.

No inguinal pores.

Calcic tufts?

Four teats.

Strong caprine odour in males.

Types. 1, *Capra Jemlaica*. 2, *Capra Jharál vel Quadrirammiss*. 3, *Capra Waryatu*, whose female is *Hylocrius*. Habitat the loftiest mountains of India: the Sub-Himalayas near the snows and the highest part of the Nilgiris. A very remarkable type tending to connect the keeled, compressed, hollow-horned and odorous Goats with the Deer family which want these marks, but possess the mufle and 4 teats of the Hemitrages, marks which the true Goats (and Sheep) are void of.

The Jharál's retreats are among the most inaccessible bare crags of the Hemáchal, close to the perpetual snows, beyond the forests. They feed in the open glades below such crags, at early morning and evening, retiring in the day to their awful fastnesses. They are gregarious and the flocks often amount to 40 or 50 animals, but generally do not exceed 20 or 30. If alarmed when feeding they go off at speed with a noise like thunder, but anon halt to gaze on the intruder, whose shot sends

them off again under the guidance of an old male whom they all follow blindly. The rutting season is the winter. The females gestate 6 months and produce usually but one young, in the months of June, July. The habitat and manners of the wild sheep are very similar to those of the Jharáls, only the latter are still more dauntless and skilful climbers. If they can but touch a rough edge or crevice now and then, they will run up nearly perpendicular precipices of many feet elevation; and they will stand on a bit of rock not larger than one's palm, looking confidently down over sheer space, with not a shrub to break the awful absence of rest for the foot. In February 1842, a male Jharál in possession of the Court of Nepaul had intercourse with a female Axis, which in July produced a young hybrid of mixed appearance, but more like the mother than the father, and which lived and grew up a fine animal. I saw it last in October 1843. I note the circumstance as a strong corroboration of that affinity of the Hemitragæ to the Deer (not Bovines, as Mr. Ogilby supposed) which is indicated by the 4 teats and moist muzzle of the former, notwithstanding that the Hemitragæ in all other parts of their structure, as well as in their rank odour and in their manners are such perfect goats. From the true goats however they differ, besides the grand points noted, by the total absence of beard and of feet pores. Nor could I ever get any progeny from the goats by the Jharál,* though my male of the latter species had commerce with Goats of several breeds, repeatedly, during the 6 years he lived with me, quite tame and going abroad with the sheep and goats. Small intestines 53 feet. Large, 25=78 feet. Cæcum 1 foot long and $2\frac{1}{4}$ inches wide. Small gut $\frac{3}{4}$ inch in diameter; great gut $2\frac{1}{2}$. Cæcum simple, that is, not banded nor sacked.

18. Genus CAPRA.

Bakra Goats.

Horns in both sexes.

No mufle.

Feet-pits in the forefeet only or none.

No inguinal pores.

Mammæ two.

Odour intense in males.

Calcic tufts none.

* They copulated freely and I was told would breed. Hence the erroneous statement in the Journal for Sept. 1835, disproved by experiments.

Type, *Capra ægagrus*. Habitat Persia. Foreign to India, and not therefore subject to my examination: but the several tame races of Tibet and the sub-Himalayas (Chandra, Chyapu, Sinál) and also the common Goats of the plains (Dûgû and Jamnaparia) are *all* typical. These animals are further distinguished by horns inserted very obliquely, not angular, compressed, and presenting a sharp keeled edge to the front, whereby they may be distinguished at once from all kinds of sheep and also from the Ibexes. They have likewise invariably a true beard common to both sexes, as have also the Ibexes; but the sheep never: and, lastly the Goats have callosities on the chest and knees or knees only. Eminently bold, saucy and scandent. Gregarious. Rut in winter. Procreate in summer. Gestate under 5 months? Produce 3, 2, or 1 young at a birth. (See paper on tame Goats and Sheep of these regions, Sp. Mag. for June, 1847.)

19. Genus IBEX.
 Skin. Kin.
 Horns in both sexes.
 No muffle.
 No eye-pits?
 Feet-pits none?
 No inguinal pores?
 Mammæ two.
 Odour in Males?
 Calcic tufts?

Types. Europea. Caucasica. Jaela. Sakin. Sibirica.

Habitat the loftiest mountains of Europe, Asia and Africa. Found in the Himalaya close to the snows. These animals, with the general manners, the odour and the beards of Goats, are distinguished invariably by angular horns presenting a distinct surface, instead of a mere edge, to the front, thereby differing from the Goats proper and approximating to the Sheep. The front of the horns is likewise remarkably nodose, and the horns are of great size and sickle-like curve. Their structural peculiarities want testing and will doubtless show deviation from the type of *Ægagrus*. Rut in autumn. Breed in spring. Gestate $5\frac{1}{2}$ months. Produce 2 or 1 kids. Gregarious, bold, and scandent.

20. Genus OVIS.
 Bhéra. Sheep.

Horns in both sexes.

No muffle.

Eye-pits large but immobile.

Feet-pits small but present in all four extremities.

Inguinal glands distinct. Pores vaguely defined.

Calcic tufts and glands none.

Mammæ two.

No odour in males.

Types, *Ovis Ammon* or the Argali of Siberia, and *Ovis Ammonoides* or the Argali of Tibet.

Habitat the snowy barriers of high Asia, *Ammon* being confined to the remoter, and *Ammonoides* to the nearer ranges. These animals are further distinguished as a group by angular, compressed, heavily wrinkled horns turned almost into a perfect circle, and their flat points directed forwards and outwards; by very short disced tails; and by the absence of beard. The wild Sheep proper, or Nyens of the Tibetans, never mix with the Nahoors. They are far more hardy, active and independant than any tame breeds of their kind, as may well be supposed from their terrific abode amid the snowy peaks of Hemachal. They are gregarious, feed in the glens, seek refuge on the tops, and leap and run with Deer-like power, though as climbers inferior to the Hemitragas, and as leapers to the Musks. They are often snowed up for days without perishing, unless their breathing holes should betray them to man, a more terrible foe, than the direst inclemency of the seasons! They rut in winter, breed in early summer and gestate it is said, 6 months, probably not above 160 days. The Nyens or Ban Bheras (that is, wild sheep) seldom or never cross the Hemachal, the Indian side of which range is the special habitat of the Nahoors, while to the North and West *beyond* Tibet, our animals are replaced by other species; so that Tibet may be considered as the special habitat of one species and the plateaux North of Tibet as far as the Altai, as that of the other species, above cited as types of the true ovine form; and it may here be added that the six sorts of tame sheep of Tibet and the Sub-Himalayas, all, without exception, exhibit the essential characters of that form.

21. Genus *PSEUDOIS*.^{*}
 Nahoor.
 Horns in both sexes.
 No muffle.
 No eye-pits.
 Feet-pits small in all four feet.
 Inguinal glands distinct. Pores vague.
 Calcic tufts none.
 Mammæ two.
 No odour in males.

Types, *Ovis Nahoor* and *Ovis Barhel*.

Habitat the Himalayas.

These animals are contradistinguished, besides the want of eye-pits, by rounded uncompressed smooth horns directed upwards and backwards with great divergency, and their round points again bent inwards; by short deer-like tails, but longer than in the last and undisc'd; and, lastly, by the absence of any thing like mane or beard. The Nahoors rut in winter, breed in summer and gestate $5\frac{1}{3}$ months. Their manners, so far as known, resemble those of the Nyens: but the two never commingle nor approach each other, nor will the males, how long and completely soever they be tamed have sexual commerce with domestic sheep. Great gut 24 feet. Small gut 50 feet. Cæcum 17 inches, by $2\frac{1}{2}$ wide. Large gut near it, of same diameter. Liver 2 lobed, each subdivided and a labulus. Ribs 13 pairs.

22. Genus *CAPROVIS*.
 Moufflons.
 Horns in the males only.
 No muffle.
 Eye-pits small but distinct.
 No interdigital pits.
 Inguinal gland? pore?
 No calcic tuft?
 Mammæ two.
 No caprine odour.†

Further distinguished by horns bent into a half circle over the back,

^{*} *ψευδος* et *δῖς*, see Journal, No. 173.

† This is the only form not verified by myself that I have meddled with, and I am indebted to the Prince of Canino for its characters.

heavily wrinkled, angular and compressed, by deer-like tails, no beard nor mane nor caudal disc.

Type, *Ovis Musimon*. The Moufflon. Habitat Corsica, Sardinia.

N. B. The 'Muffle' is the naked moist skin round the end of the upper lip and nostrils, seen in perfection in the Ox. The 'eye-pits' are slits or punctures on the cheek, just below the eye. They are round or linear and elongate: and, if the latter, are curved or straight and can be turned almost inside out, or are partially or wholly immobile. The 'feet-pits' are punctures in front of the pastern, in the cleft between the two bones. The 'groin-pits' are fissures in the groin more or less definite in outline, and furnished with glands which secrete a fragrant viscid substance very like the secretion of the other sinuses.

The 'calcic glands' are placed on the stifle, inside and outside, or only the one, and are often naked and tumid externally. There is a whorl or callous nude spot in many quadrupeds at its side.

The 'tail gland' of the Musks is very large and covers the whole tail nearly, and has a linear longitudinal pore on each side, and an abundant secretion.

The 'preputial gland' of the Musks is analogous to that of the civets and screwtails (*Paradoxurus*, vulgo Málwa.) It is placed on the prepuce, the penis opening in the midst of it. This organ is clearly subservient to sexual purposes, and so probably are several of the others, though the eye-pits have been variously referred to the facilitation of breathing and of smelling. The supposed end of the interdigital gland and pore or feet-pits, viz., the lubrication of the foot and preservation of the hoof in hot sandy deserts, is clearly erroneous, since the Thár has these organs of enormous size in all 4 extremities, though it be the tenant of moist cool mountain forests. It is probable that the secretion from the foot pores enables these animals to find one another in those wildernesses of vast forest trees and dense undergrowth which constitute their range.

The shape of the orifice and of the gland, and the nature of the secretion from the latter, as well as the periodical augmentation thereof, should be closely attended to—and that *generally*, or with reference to *all* these pits or sinuses. The distinctive form of the upper outline of the skull, and character of the core of the horns, in the Antelopidæ or Antelope kind, and in the Capridæ or Goat and Sheep kind, and again

in the Deer kind and Ox kind, the subjoined sketches (See Plate) will best make me understood; and I would suggest particular attention to this point as a key, as well to the mutual affinities, as to the differential characters of all these groups. The Antelopes are thus clearly separated from the Goats and Sheep, and distributed into two groups of their own, one that of the more typical genera which class with the Flocks; the other, that of the abnormal genera, which range with the Herds.—I meddle not with the last named group or Bovine Antelopes (*Busdorcidae*): but in regard to all the others, inclusive of the Musks whose Cervine affinities are thus made palpable, I beg of you to examine well the sketches and to note the signal and abrupt fall of the postcal plane of the skulls in the Caprine and Bovine Families, and its gentle slope in the Cervine and Antelopine Families. The Antelopine skull depicted is that of the Thár, and you may thus satisfy yourself at once that this type (as well as *Kemas* which agrees* with *Nemorhædus* in this important point) is an Antelopine, not Bovine type. In like manner—that is by attending to the form of the skull and the consequent position of the condyles—you may obtain demonstration of the Caprine affinities of *Hemetragus*; and, in fact, the whole genera of these perplexing families may thus be set in order.

I now proceed to the Bovines or Ox kind.

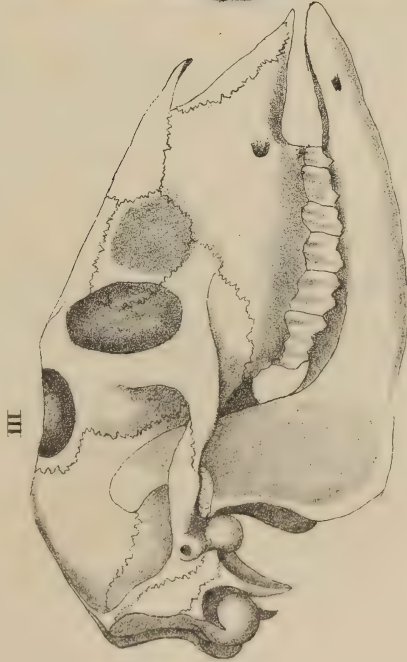
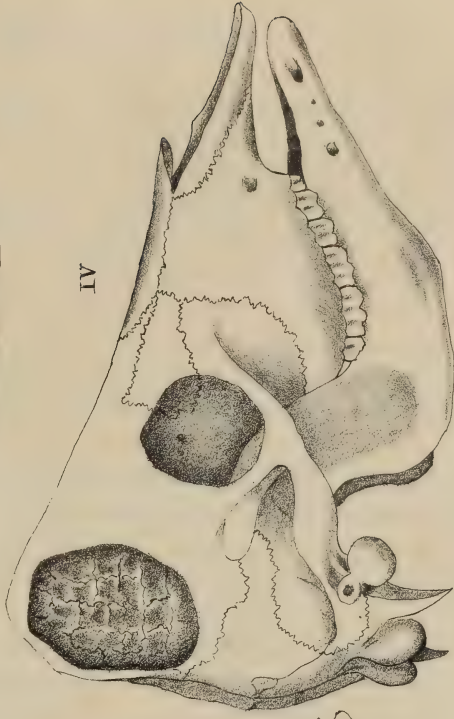
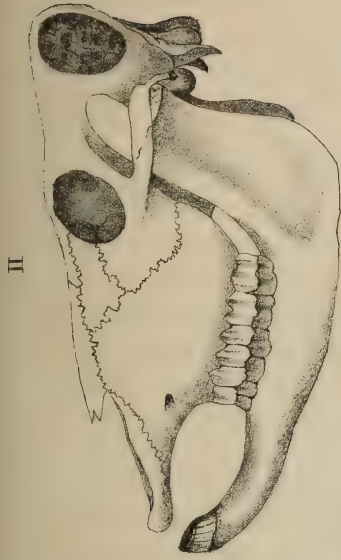
CAVICORNIAE MAJORES, or,

Bovidae or Herds. Gaudrisha.

Hoofs cloven. Occipital plane of skull forming a large angle with frontal plane. Horns hollow, persistent, sheathed, with a thick cellular core springing laterally from the apex of the forehead.† Muzzle large. Front teeth, above none. Below 8. Canines none? Molars 6. Teats 4. Dewlap present or wanting.

* The agreement is not close, so that *Goral* is osculant towards the *Capridæ*. The characters of both were printed by me (*Journal*, Sept. 1835) a year and quarter before *Mr. Ogilby*, (Dec. 1836, *Zool. Jour.*)

† These marks of the family may be supposed exclusive to the subfamily: but I apprehend not, and that they will serve usefully to sunder the antelopes allied to *Bos* and those not so allied, or *Antelopidae* and *Busdorcinae*.



I Skull of Cervidae. II of Bovidae. III of Antelopidae. IV of Capridae.

BOVINÆ OR OX KIND.

Gauádi.

Occipital plane of the skull forming a large angle with the frontal plane. Core of the horns massive and very porous or cellular. Horns in both sexes, inserted laterally on the apex of the frontal crest. Canines none. Mufle very large. Teats invariably 4. Dewlap, in most, normally. No eye-pits. No feet-pits. No groin-pits.

1. Genus *Bos*. Oxen.
Gau.

Cranium moderate, compressed, proportional, or without excess in the cerebral or facial region. Frontals shorter than the face, flat, and not broader than long.

Occipital plane of the skull square, never arched along the ridge line, nor indented by the temporal pits, smaller than the frontal plane and forming an acute angle therewith.

Condyles of great foramen and of lower jaw, elevated greatly, and the jaw much curved.

Horns attached to the highest line of the forehead, rounded, curved up or down or forward ascendantly.

Orbits not salient.

Thirteen pair of ribs.

No true dorsal ridge, but sometimes a fleshy hump.

Mufle very large and square.

Dewlap great.

Type. *Bos domesticus*. Gau.

2. Genus *GAVEUS*.
Gavi or Gabi.

Cranium large, having the ample flat forehead as long as the face and broader than long, but not ridged nor curved along its crest.

Occipital plane equal to the frontal plane and moderately indented subcentrally by the temporal fosses, square and forming an acute angle with the frontal plane.

Condyles of great foramen and of lower jaw low, and the jaw little bent.

Orbits not salient.

Horns attached to highest line of forehead, more or less depressed, and angular, and directed upwards and outwards with little curvature.

A true dorsal ridge but confined to the withers.

Mufle moderate.

Dewlap moderate.

Thirteen pairs of ribs.

Type. *Bos frontalis* vel *Gayceus* vel *Sylhetanus*.

The Gavi or Gabi. Habitat trans-Brahmaputram, the forests under the ranges extending from Assam to the sea. The *Sénbár* vel *Phain* may probably be a second species, and *Bos Sondaicus* or the *Benteng*, a 3rd, and the insular species: but these want testing. The first is more than half redeemed from the wild state, like the Yak of Tibet. The others are entirely wild. I possess no memoranda of the soft anatomy or intestines, nor of the breeding season and gestation.

3. Genus *BIBOS*. Gaur, or Gauri Gau.

Cranium large, massive, with the frontal and cerebral portions preponderant over the facial.

Frontals as long as the face, broader than long, concave and surmounted by a salient arched crest.

Occipital plane spheroidal, very large, larger than the frontal plane, deeply indented centrally by the temporal pits, and forming an acute angle with the frontal plane.

Orbits salient.

Condyles of great foramen and of lower jaw low, and the latter straight.

Horns attached below crest of forehead, sub-depressed, sub-angular, and curving ascendantly.

Thirteen pairs of ribs.

Dorsal ridge co-extensive with the ribs, and of great elevation.

Mufle small.

Dewlap small.

Type. *Bos Gaurus* vel ? *Cavifrons*. The Gaur or Gauri Gau. Cæsar's wild Bull of Europe and Aristotle's of Persia, are two other species of

Bibos or of Gaveus, which could we test them might be respectively called *Classicus vel Cæsaris et Aristotelis*. The Gaurs inhabit the primitive forests of India generally, under the great ranges of mountains, such as the sub-Himalayas, the Vindhias, the Sathpúrás, the Gháts, Eastern and Western, and their links with the Vindhias, and with the Nilgiris. Beyond the Brahmaputra Bibos is replaced by the last type, of which there would seem to be two species in the Indo-Chinese countries, one of them extending to Ceylon, if the Lanka wild Ox be not rather a Bibos; I suspect there will prove to be at least two species of Bibos, as of *Rusa*, inhabitants of India between the Cape (Comorin) and the sub-Himalayas, or *B. Gaurus* and *B. Cavifrons*.

For the skeleton of the Gaur, I may refer the reader to the Asiatic Society's Journal, No. 114, and No. 69. Of the intestines I possess no memorandum. The period of gestation was in Nepaul always stated to me to exceed that of the common Ox: but Mr. Elliot will not allow this. The Gours rut in winter and procreate in autumn, producing usually but one young at a birth. The herds are ordinarily rather numerous, 20, 30, 40, and sometimes even double these numbers, being found together, but in the breeding season, not above 10 or 15 cows with a single mature vigorous bull, who jealously expels every young and old male from his Haram. The sub-Himalayan species entirely avoids the open Tarai on the one hand, and the hills on the other, adhering to the most solitary parts of the Saul forest, close to and between the salient spurs of the hills where the periodical firing of the undergrowth of the forest never reaches. In the Deccan these animals are said to penetrate into the hills in the hot weather—very partially, I fancy, or else they must then lack cover on the plain, for they are not a mountain race at all. They feed early and late in the more open glades of the forest, posting sentinels the while and manifesting in their whole demeanour a degree of shyness unparalleled among the Bovines. They never venture, even in the rains, when there is abundance of most rank vegetation to cover their approaches, into the open Tarai to depredate on the crops, as the wild Buffaloes constantly do; nor do they ever associate, or have sexual commerce, with the tame cattle, though immense numbers of the latter every spring are driven into their retreats to feed, and remain there in a half wild condition for three or four months, when the wild Buffaloes fre-

quently have sexual intercourse with the tame ones of their kind, of which likewise vast numbers are depastured there. Old males of the Gaur are often found solitarily wandering the forests they frequent, especially in winter : but these have probably been recently expelled the herds by their more vigorous juniors, and re-unite themselves with some herd after the season of love and contention has passed. It is exceedingly difficult to rear the Gauri Gau in confinement. Nor did I ever know a successful experiment, though the attempt has been, for 50 years past, constantly made by the Court of Nepal, which finds no difficulty in rearing wild Buffaloes and causing them to breed in confinement with the domestic species, which is thus greatly improved in size and other qualities. I have remarked on the excessive shyness of the Gaurs ; and it follows that, when approached, they will retreat so long as they can : but if compelled to stand and defend themselves, they do so with a courage and determination not to be surpassed. Their beef is unequalled for flavour and tenderness : but to the aborigines only it is illicit food, and not to all tribes of them ; nor are any of them allowed to kill the Gaur in Hindu kingdoms. The Gaur stands from 6 to 6½ feet high at the shoulder, and is either of a ruddy brown, alias tan, or of a black colour, the forehead and limbs below the mid flexures being pale, and the forehead and knees tufted. Capt. Tickell, a good observer, believes that there are two species of Bibos in the Chota Nagpoor territories *alone* ! Doubtless close investigation will reveal many new species in the Bovinæ.

4. Genus BISON.
Yak. Chouri Gau.

Cranium moderate, depressed, with the facial portion exceeding the frontal and cerebral parts.

Frontals broader than long, convex and forming on obtuse angle with the occipital plane.

Occipital plane smaller than the frontal plane, trigonal or semi-circular, and ridged by the parietes.

Orbits salient.

Condyles of great foramen and of lower jaw low, and the jaw straight.

Horns attached below the curved or pent intercornual ridge, rounded and curving out of the horizontal line.

Ribs 14 or 15 pairs.

A true dorsal ridge, confined to the withers.

Mufle small.

Dewlap none.

Types. *Americanus* et *Poephagus*.

The latter is the Yak or Chouri Gau.

It inhabits all the loftiest plateaux of High Asia between the Altai and the Himalaya, the Belut Tag and the Peling mountains, and is found wild as well as tame. It cannot live on this side the Himalayas beyond the immediate vicinity of the snows, where the tribes of the Cachár or Juxta-nivean region of the sub-Himalayas rear large herds and cross-breed with the common Ox. The Yak ruts in winter and produces young in autumn, after the usual period of Bovine gestation. Small intestines 107 feet. Large $33\frac{1}{2}$ feet. Cæcum $2\frac{1}{4}$ feet. Width of small gut $1\frac{1}{2}$ inches; of great, 2 inches; of cæcum 4 inches. Cæcum simple, that is, not saccéd nor banded.

5. GENUS BUBALUS.

Bhainsa. Arna.

Cranium large, elongate, compressed, exhibiting great excess in the facial over the frontal and cerebral portions.

Frontals short, narrow, convex, forming an obtuse angle with the occipital plane.

Occipital plane larger than the frontal, spheroidal, moderately indented.

Condyles of the foramen and lower jaw low, and the jaw little curved.

Horns attached to highest line of frontals, depressed, angular, and horizontal.

Thirteen pairs of ribs.

No true dorsal ridge nor hump.

Mufle very large and square.

Dewlap medial.

Types. *Bubalus Buffelus*, or the Bhainsa, and *Bubalus Arna* or the Arna.*

Habitat of the tame, universal; of the wild, also every where where adequate cover and swamp exist. The haunts of the Arna or wild

* *Bornouensis* and *Brachycerus* are to my mind no Buffaloes, and their united horns form a character at variance not only with the genus but the family. Hence I denominate them from this feature *Syncerus* (*συν* et *κερος*). They are foreign to India, the land of the true Buffaloes.

Buffaloe are the margins rather than the interior of primeval forests. They never ascend the mountains, and adhere, like Rhinoceroses, to the most swampy sites of the districts they frequent. There is no animal upon which ages of domestication have made so small an impression as upon the Buffaloe, the tame species being still most clearly referrible to the wild ones at present frequenting all the great swampy jungles of India. But in those wildernesses as in the cow-houses, a marked distinction may be observed between the long-horned and curve-horned Buffaloes, or the *Macrocerus* and *Speirocerus* of my Catalogue—which whether they be separate species or merely varieties, I shall not venture to decide, but I incline to regard them as species. The length of the horns of *Macrocerus* is sometimes truly enormous, or $6\frac{1}{2}$ feet each.

There is such a pair in the British Museum, and another pair I saw in Tirhut. The Arna ruts in autumn and the females produce one or two young in summer after a gestation of 10 months. The herds are usually numerous and sometimes exceedingly so, though at the season of love the most lusty males lead off and appropriate several females with which they form small herds for the time. I have no memorandum of the intestines of the Arna. This noble species is, in the Saul forest and Tarai, a truly stupendous animal, as tall as the Gaur and longer considerably, and of such power and vigour as by his charge frequently to prostrate a well-sized elephant! The wild animals are fully a third larger than the largest tame breed, and measure from snout to vent $10\frac{1}{2}$ feet, and six to six and half feet high at the shoulder. The wild Buffaloe is remarkable for the uniform shortness of its tail, which extends not lower than the hock; for the tufts which cover his forehead and knees; and, lastly, for the great size of his horns and the uniform high condition of the animal, so unlike the leanness and angularity of the domestic buffaloe's figure, even at its best.

I have now disposed of all the Bovines proper of India, and might next proceed to the Bovine Antelopes or *Busdorcinae* which form another sub-family of the *Bovidae*. But those animals, with one exception, and that a doubtful one—viz. *Portax picta* or the Nilgau—are wholly foreign to India, and the Nilgau itself rarely found on the left bank of the Ganges, how common soever across that river all the way to the Deccan and Carnatic. Wherefore, having no personal knowledge of the group, I leave it untouched. It will be seen above that my

principle of generic classification is organic. I assume that *every* organic variation is a sign of genus ; that *nothing but* organic variation is a sign of genus ; that we are too ignorant at present of the real nature and use of most organs to decide on their relative value and to reject some because they seem comparatively uninfluential on the habits and economy of the animal endowed with them ; that the organ is always the datum ; its use always the desideratum, and that all organs ought to be prominently set forth until their structures, uses and relative importance be decided on ; that all three sorts of teeth are organs, and all therefore are properly introduced to mark genera and even higher groups ; that there is *not* that entire uniformity of dentition among the Ruminants which has been so long asserted ; and, lastly, that the special form of the horns in the *Cirvidæ*, though not strictly an organic mark, may yet be wisely used at present to help the indication of genera, because it is a very palpable sign, and one besides usually harmonising with, and indicative of other and organic modifications yet partially or wholly understood.*

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*Notice on the Ferruginous Spherules imbedded in Sandstone from Lulupore, in Bundelcund, by Dr. G. G. SPILSBURY.—By H. PIDDINGTON, Curator Museum Economic Geology.*

We have received from Dr. Spilsbury an additional supply of the curious little Ferruginous Spherules described in my report of September 1846, from their resemblance in miniature to the spherical volcanic Bombs figured by Mr. Darwin as being possibly *volcanic grape-shot*, and since that time I have observed that some being sent to the Agricultural Society, Dr. McClelland thought they might be fossil fruits. I have seen these and find them externally the same as ours, and I have therefore submitted ours to a farther examination, of which the result is—

That they are infusible before the blowpipe ; that they are not magnetic, but when exposed to the reducing flame of the blowpipe they become so. That when dissected by long immersion in muriatic acid they leave nothing but a residuum of coarse white granular silex and

\* Mr. Hodgson's correction of an oversight in the description of Genus *Axis*, page 691, reached us after the sheet had been printed off. For "canines in males only," read "canines in both sexes."—EDS.



a finer one in a gray impalpable powder, which being examined before the blowpipe is silica with oxide of Iron.

There is no trace of any thing like organic arrangement, such as cells, &c. which are rarely completely obliterated in fossil fruits, how complete soever the mineralisation of the substance of the fruit may be.

The strongest proof however to my mind that they are not fossil fruits, but originally ferruginous spherules, whether formed by volcanic action (or by that which produces the pisolitic iron ores?) arises from the matrix in some of the specimens being almost wholly destitute of iron! and the spherule having evidently *given iron to it*, round its place, in which when detached it leaves a coating of peroxide of iron which stains the sandstone. Now if the spherule had been originally a fruit, it must have obtained its iron from the sandstone itself or from filtration through it, which would have stained it, for we know of no colourless solution of iron like those of silex and lime, which may pass through a rock and be deposited in bodies for which they have an affinity without leaving coloured traces of their passage.

One which I fractured contained a nucleus, excentrically situated, of coarse sand, as if it had been inclosed in a globule of molten iron.

This spherule weighed 33 grains and gave by muriatic acid approximately as follows :

|                                                     |       |      |
|-----------------------------------------------------|-------|------|
| Of coarse silica, .....                             | 16    | grs. |
| Fine impalpable powder of silica with some iron, .. | 4     |      |
| Oxide of Iron, .....                                | 13    |      |
|                                                     | <hr/> |      |
|                                                     | 33    |      |

I am therefore still inclined to think these spherules inorganic, and that they have been suddenly deposited in their present position as ferruginous globules, but by what agency we cannot say. The amount of sand in them would almost entitle them to be called ferruginous sandstones.

Mr. Darwin, in his recent work on South America, p. 123, describes some ferruginous volcanic concretions, which are however fusible, as from two inches to two feet in diameter; their insides consisting of a fine scarcely adherent volcanic sand or of an argillaceous tuff. He quotes also D'Aubuisson (to whose work I have not the opportunity of referring) as adverting to the tendency of iron to form hollow concre-

tions or shells containing incoherent matter. Our spherulites are evidently yet a problem for resolution, and it is only by attention to the mineralogical conditions of it that we can hope to see its geological bearings properly estimated.

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*Notice of the Deo Monnees,\* or sacred beads of Assam, by the same.*

Major Jenkins sends me in a letter a string of six of these singular objects, of which he says:—

“I shall be obliged if you can tell me what these beads are, and if you know where any similar are to be had, and whether they are artificial or natural? I suppose the latter are jaspers?”

“You may have seen such and blue and white beads made into necklaces by the Faqueers, the blue and these are in very great demand with all our hill tribes, and could I obtain a few strings of sizes they would be very useful to give as occasional presents to chiefs whom we may seek to attach to our government. Why these beads are considered so valuable amongst these tribes I only account for by supposing they are very scarce, could they not be easily imitated?”

And Captain Smith writing to him says:—

“I send you some of the Deo Monnees so prized by the Singphos and without a string of them, a wife is not to be had. I send small ones, as I should have to pay 5 Rs. for a large sized *one*; those similar in grain to the *Ash* wood and irregularly bored are most prized, they should be of both the colors I send; they are valued most because they are supposed to be the real Deo Monnee, and are said to be found ready bored. Those that are particularly smooth outside, and regularly bored are not so valued, as they are thought to be the work of man's hands, whereas the others are by the gods themselves.”

These singular objects of veneration (the small-sized ones as sent to us) are small flat circular disks, about from one to  $1\frac{1}{2}$  eighth of an inch thick and from one to two eighths in diameter, with holes in the middle or towards it. The colors are from a dirty greenish yellow to a bright sealing wax red; some are yellowish and marbled with the red colour in veins like Jaspers, but the red ones are not marbled with yellow. These

\* *Deo Monnee*, Jewel of the gods.

disks appear at first sight like sections of the jasperized stems of gramineous plants, or small pithy wood, and at the edges some of them (the yellow more than the red) appear marked with striae exactly like part of a small petrified twig. When polished however no traces of vessels can be discerned on the transverse section of either the green or red ones by a magnifier.

Selecting one which was a fair medium between the yellow and the red, I submitted it to the following tests. Premising however that its entire weight was not more than  $1\frac{1}{2}$  grain.

*Examination.*

It is excessively brittle, the fracture may be called splintery—conchoidal, as well as one can distinguish in such minute specimens, and it is the most splintery substance I am acquainted with, the slightest touches of the pestle making it fly as if from an explosion, so that it must be powdered in a covered or a steel mortar. The fractured surface is that of a red enamel or bright sealing wax. The powder resembles brick-dust. The hardness is 5-6, or between Apatite and Adularia. It scratches Fluor readily, and does not yield to the knife.

It does not adhere to the tongue or show any effervescence with acids. Its smell, if any thing with such small specimens, is metallic when breathed upon. It is not magnetic.

*Before the blowpipe* in the forceps and on charcoal it fuses immediately to a dark steel-coloured brilliant globule, which below is marbled with broad greyish and dirty white veins. This globule is not magnetic and internally has the red fracture of the fresh *Deo Monnee*.

*With borax on Platina wire* it fuses entirely to a bright emerald green glass while hot, which becomes of a pale blue on cooling.

With the addition of metallic tin this bead gives a brownish red enamel. The colouring matter of the *Deo Monnee* therefore is principally protoxide, and perhaps the suboxide of copper, and, as will be subsequently seen some iron.

*Vid Humidd.*

The powder is not soluble in Muriatic, Sulphuric or Nitric acids. The Sulphuric acid gives it a dull brick or brown-red colour which becomes brighter after several days, the other two acids brighten the powder almost to an orange, though quite colourless.

Boiled in Nitro-Hydrochloric acid a part appeared to dissolve and the vapour had a remarkably disagreeable smell.

The filtered solution gave traces of Iron, and faintly but distinctly of Copper, though not so strong as one would expect from the blowpipe test. The red powder remaining on the filter fused readily with caustic soda in a silver capsule, and when cold was a dirty greenish mass, the whole of which was soluble in Muriatic acid and the solution gave also traces of Iron and Copper.

It was evaporated to dryness and redissolved in pure water, when it left untouched a buff-coloured powder, which by the blowpipe was found to be silica tinged with Iron, the solution gave as before traces of Iron; but was too dilute to show the Copper. I suppose indeed that much of the Copper may have been volatilised, and it is possible that the substance may contain Arsenic.

The above I publish merely as a guide for future investigations when more of the substance can be obtained, such preliminary notes being always of great utility to the working chemist. In reply to Major Jenkins I should say—

That the fusibility and low degree of hardness of the one bead we have experimented upon, while it puts it out of the classes of Jaspers and Pitchstones (of which further we know of none containing copper?) would incline as to believe that it is an enamel, in which the oxides of copper are frequently used as the red colouring matters; and it is not difficult to suppose that the Singphos obtain these, fabricated to imitate Jaspers of these colours, through tribes in intercourse with the Chinese of Yunnan. The talent of the Chinese in enamel work of all kinds we well know, and no doubt the beads might be imitated by any person who understood enamelling.

The only natural mineral beads I can find in the bazar are red and white cornelians. Some of blue glass have, I observe, striæ on the unground facets so that the circumstance of our Deo Monnees having them does not count as an evidence of their being natural productions.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
JUNE, 1847.

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The usual monthly meeting of the Asiatic Society was held on Wednesday evening, the 2d of June.

*Capt. WM. MUNRO, in the Chair.*

The minutes of proceedings of the last meeting were read and adopted, and the accounts and vouchers for May laid on the table as usual.

The following gentlemen having been duly proposed and seconded at the May meeting, were ballotted for and duly elected :—

R. O'Dowda, Esq.

Lieut. Thuillier, B. A.

J. B. Elliott, Esq. C. S.

H. W. Elliott, Esq. C. S.

Capt. Thos. Brodie, 5th N. I.

Lieut. Ed. Tuite Dalton, 9th N. I.

C. B. Skinner, Esq.

F. E. Hall, Esq.

J. Johnstone, Esq.

Mr. E. Currie of the Civil Service was named as a candidate for election, proposed by Mr. E. C. Samuells, seconded by Mr. Bushby.

Read letters—

From Major Sturt, Secretary to Government of India, Military Department, forwarding copy of a pamphlet by Professor Ansted, entitled, "Facts and suggestions concerning the Economic Geology of India."

From Mr. Secretary Young, forwarding the annexed correspondence regarding the discovery of Cannel coal at Junk Ceylon.

(No. 461.)

*From the Under Secretary to the Government of Bengal,  
To the Secretary to the Asiatic Society,*

STEAM.

*Dated, Fort William, the 19th May, 1847.*

Letter from the Governor of P. W. Island, Singapore and Malacca, No. 31 of 27th February, 1847.

Ditto Mint Master of Calcutta No. 456, dated 30th ultimo, 1 Enclosure.

Ditto to Governor of P. W. Island Singapore and Malacca, No. 469, dated 19th inst.

SIR,—I am directed to transmit for the information of the Society a copy of the Correspondence noted in the margin regarding a specimen of Coal discovered in Junk Ceylon.

I have the honor to be, Sir,

Your most obedient servant,

A. R. YOUNG,

*Under-Secretary to the Government of Bengal.*

(No. 31.)

*From the Governor of P. W. Island, Singapore and Malacca,  
To C. BEADON, Esq., Under-Secretary to the Government of Bengal, Fort  
William. Dated, Singapore, 27th February, 1847.*

SIR,—My letter under date the 26th July 1845, No. 124, will have made the Hon'ble the Deputy Governor of Bengal acquainted with my belief that Coal was to be found in the vicinity of Penang, and although I failed at that time, in discovering the mineral, yet I did not relax my inquiries, and I am now enabled to report very satisfactorily on the subject.

On the recent return of the Hon'ble East India Company's Steamer Hooghly from the Northern end of the Straits, after conveying the Hon'ble Recorder, and Court Establishment to Penang, Captain Congalton brought me a specimen of Coal which had been deposited by some person at the Harbour Master's Office; search had been made for the party without avail, and I apprehended that I should be again baffled, when I was favored with a letter, regarding the said Coal, by the Resident Councillor at Penang, a copy of which I beg to enclose.

The Hon'ble the Deputy Governor will observe that the Coal now discovered, (a specimen of which I beg to forward for the purpose of being tested,) is found on the Southern Coast of the Island of Junk Ceylon, which is not far from the River Gurbie, on the Malayan Peninsula, where my former search was made, and if we may judge from the seam noticed by Kong Kiyon, who brought in the Coal, there must be a large quantity available.

I do not think that Kong Kiyon is competent to enter into the engagement proposed by the Resident Councillor at Penang, or that we should be justified in making any agreement with him to supply the mineral from the territory of our Ally, the King of Siam, without previously ascertaining

how far he may be cognizant of such a proceeding; neither would the price demanded, viz. 7 dollars per ton, justify me in laying in any quantity whilst that of ascertained good quality can be purchased for 6 dollars per ton.

I have however ventured to authorize Mr. Garling, to commission from Kong Kiyon two or three coyans of the Coal, and on delivery, to present him with 25 dollars from Government in addition to the price of the Coal, for having made the discovery known to the authorities, and with a view of inducing others to come forward with any information likely to develop the resources of these settlements, and the adjacent native states, which I trust will meet with the approval of the Hon'ble the Deputy Governor of Bengal.

The Junks from China and Cochin China are now daily making their appearance, and I am averse to withdrawing the Steamer from the vicinity of Point Romania for any lengthened period, or I would have furnished a more full Report on the subject of this Coal, but I hope to proceed on my annual tour early in May, or as soon as it shall be ascertained, by the change of the monsoon, that the whole of the Junks of the season have arrived, when I shall send the Hooghly to Junk Ceylon, and do myself the honor of reporting the result.

I have the honor to be, &c.

(Signed) W. J. BUTTERWORTH,

Governor.

*Singapore, 27th February, 1847.*

(No. 161 of 1847.)

*From the Resident Councillor Prince of Wales Island.*

*To the Hon'ble the Governor, &c. &c. &c.*

SIR,—Captain Congalton, in command of the Hon'ble Company's Steamer Hooghly, will have shown to you a muster of Coal brought to Penang just about the time the Steamer reached this port. He procured the muster from Mr. Gottlieb, the Harbour Master, but no particulars could be obtained, as the man who brought the sample could not be found. Mr. Gottlieb having at last succeeded in tracing the man, sent him to my office, and I have now the honor of giving you the result of my inquiries. The man's name is Kong Kiyon, a Siamese by community, but born in Penang. By his statement, the Sample was found on the river bank mingled with the mud, close upon the jungle, and about 2 or 3 hundred feet from the mouth of the river, on the Southern Coast of the Island of Junk Ceylon. There are rocks on the coast—Kong Kiyon went there to collect Ratans—any persons may there go into the jungles and collect what they please; sometime since he brought a piece of this mineral to Penang, but it was considered as useless. Having been spoken to on the subject, immediately he came upon this Coal as stated,

he set to cooking his rice with it, and finding it answer the purpose well, he ventured to bring away about 4 or 5 coyans of it. The boat has now gone away and he has now left but one small piece, which he promised to bring to my office.

He discovered a stratum about 3 feet in thickness close under the surface, but of its length and breadth he knows nothing. Why the people do not use it for culinary purposes he knows not, but supposes that they may know nothing about it. There are no inhabitants in the vicinity of the Coal, and he entertains no difficulty in bringing away any quantity.

Kong Kiyon told Mr. Gottlieb that he would engage to bring the Coal at the rate of \$12 per coyang of 45 Peculs. He has thought better of it. He tells me that, after consulting his comrades, he would not engage under \$150 for an 8 coyang boat load, being upwards of 50 per cent. beyond his offer to Mr. Gottlieb. But Kong Kiyon says, that for \$150 per load of an 8 coyang boat, he will enter into a bond with securities to supply the mineral always, provided a small advance of cash be made to him, as he has no funds of his own.

Mr. Gottlieb brought one piece burnt. It had the appearance and smell of a common cinder, only it was very light in weight. Captain Congalton spoke well of it after trial.

I shall await your instructions in this matter.

I have, &c.

(Signed) S. GARLING,  
*Resident Councillor.*

*P. W. Island, the 13th February, 1847.*

15th.—P. S. The specimen of Coal not having yet come to hand, I shall no longer detain this letter.

(Signed) S. GARLING,  
*Resident Councillor.*

(True Copy)

(Signed) W. J. BUTTERWORTH,  
*Governor.*

(No. 290.)

Copy of this letter and of its enclosure, together with the specimen of Coal otherwise received, forwarded to the Mint Master of Calcutta, for the purpose therein mentioned.

By order of the Hon'ble the Deputy Governor of Bengal.

(Signed) C. BEADON,  
*Under Secretary to the Governor of Bengal.*

*Fort William, 7th April, 1847.*



(No. 456 of 1846-47.)

*From Lieut.-Col. W. N. FORBES, Mint Master.*

*To C. BEADON, Esq. Under Secretary to the Government of Bengal.*

SIR,—I have the honor to acknowledge the receipt of your letter No. 290, dated the 7th April 1847, forwarding a copy of a letter and enclosures from the Governor of P. W. Island, Singapore and Malacca, together with the specimen of Coal which accompanied them, and in reply to state that, as the specimen supplied was insufficient for experiments conducted in the Steam Engine, or other mint furnaces, I requested Dr. W. B. O'Shaughnessy, Chemical Examiner to Government to examine it in detail, and I have now the pleasure of transmitting in original his very satisfactory report on its assay and analysis.

I have, &c.

(Signed) W. N. FORBES,  
*Mint Master.*

*Calcutta Mint, the 20th April, 1847.*

(No. 26.)

*From Dr. W. B. O'SHAUGHNESSY, Chemical Examiner to Government,  
To Lieut.-Col. W. N. FORBES, Mint Master.*

*Dated, Chemical Examiner's Office, Fort William, 30th April, 1847.*

SIR,—In reply to your letter of the 14th inst. requesting me to furnish a report on a specimen of Coal received from the Government of Bengal, I have the honor to send you the accompanying memorandum of the results of its analysis, which shows that this Coal is by far the most valuable hitherto found in this or adjacent countries.

2. The coal is identical with the "Cannel" or "Wigan" kind. It is free from sulphur, cokes well and yields such an abundance of gaseous inflammable matter as to be of the utmost value for generating steam or manufacturing gas. The proportion of ash is moreover very small. The discovery of this *kind* of coal promises moreover to prove of additional importance in as much as it is generally found to accompany deposits of the richest and best ordinary coking coal.

3. The documents sent with your letter are herewith returned.

I have, &c.

(Signed) W. B. O'SHAUGHNESSY,  
*Chemical Examiner.*

Memorandum of composition of specimen of Coal from Junk Ceylon, compared with that of English Cannel Coal.

|                                | Specific gravity. | In 100 Parts.    |        |       |
|--------------------------------|-------------------|------------------|--------|-------|
|                                |                   | Volatile matter. | Coke.  | Ash.  |
| Junk Ceylon Coal, . . . . .    | 1. 25             | 60.40            | 39.58  | 2.50  |
| English Cannel Coal, . . . . . | 1. 27 †           | 60.00*           | 40.00* | 0.30† |

(Signed) W. B. O'SHAUGHNESSY,  
*Chemical Examiner.*

*Calcutta, 30th April, 1847.*

\* *Dr. Thomson.*—Brande's Manual, pp. 9, 83.

† *Berthier.*—Traite des Essais, Vol. 1, pp. 328, 336 and 339.

(No. 469.)

*From the Under Secretary to the Government of Bengal,*

*To the Governor of Prince of Wales' Island, Singapore and Malacca,*

*Dated Fort William, the 19th May, 1847.*

SIR,—I am directed to transmit for your information copy of a letter from the Mint Master of Calcutta, No. 456, dated the 30th ultimo, with the Chemical Examiner's Report which accompanied it, on the specimen of Coal received with your letter No. 31, dated the 27th February last.

2. You will observe that the quantity forwarded by you was not sufficient for such experiments as are conducted in the Steam Engine and Mint Furnaces, and you are therefore requested to procure a larger supply of the same description of Coal. It is very desirable too that the locality in which it is found should be more accurately ascertained and described, and the Deputy Governor feels assured that you will use every effort to obtain the fullest particulars on this point as well as every other connected with this important subject.

I have, &c.

(Signed) A. R. YOUNG,

*Under-Secretary to the Government of Bengal.*

*Fort William, the 19th May, 1847.*

(True Copies.)

A. R. YOUNG,

*Under-Secretary to the Government of Bengal.*

From Captain James Abbott, giving further details on the manufacture of the Damasqued sword blades of Goojrat.

From Mr. Hodgson, forwarding a paper on the crestless Porcupine, *with plates.*

From the Rev. Mr. Mason ditto on the Gamboge tree of Tenasserim.

From Dr. Cantor ditto on the Reptiles of the Malayan peninsula and Islands.

From Mr. Piddington, presenting a chart of the hurricanes in the bay of Bengal.

From the Officiating Deputy Surveyor General, presenting the Meteorological Register for May.

From Mr. Hodgson, presenting a paper on various genera of the Ruminants, *with plates.*

From the Librarian, submitting the MS. of a popular catalogue of the curiosities in the Society's Museum, (referred to the Committee of Papers.)

From Mr. Blyth, applying for a supply of spirits of Wine for the Museum.

The purchase of 6 gallons monthly was sanctioned accordingly.

A memorandum was submitted from the Oriental Section, recommending the publication of Mr. Hodgson's Essays on the Bodo, Dhimal and Koch dialects of the sub-Himalayan aborigines, to be published as a separate work, at the expense of the Oriental Fund.

Resolved that this proposition be referred to the Committee of Papers, it being doubtful whether the Oriental Fund can be employed for any but classical or ancient works.

On the proposition of the Secretaries, on the part of the Committee of Papers, a copy of Victor Jacquemont's Travels in India was directed to be purchased for the Library.

The following list was submitted by the Librarian :—

*Books received for the Meeting of Wednesday, the 2d June, 1847.*

#### PRESENTED.

The Chenchwars, a wild tribe inhabiting the forests of the Eastern Ghauts, by Captain Newbold.—BY THE AUTHOR.

The Gospel of St. Matthew, translated and printed in the Lepcha language, by the Rev. William Start, Missionary at Darjeeling.—BY THE AUTHOR.

Summary of the Geology of Southern India, by Captain Newbold.—By THE AUTHOR.

Annals of the Lyceum of Natural History of New York, Vol. IV. No. 5—7.—By THE SOCIETY.

Account of a Visit to the Bitter Lakes, Isthmus of Suez, by the bed of the ancient Canal of Nechos, the “Khalej al kudim” خليج القديم of the Arabs, in June 1842, by Captain Newbold.—By THE AUTHOR.

Description of the Wild Ass and Wolf of Tibet, with illustrations, by B. H. Hodgson, Esq.—By THE AUTHOR.

Catalogue of the specimens and drawings of Mammalia and birds of Nepal and Thibet, presented by B. H. Hodgson, Esq. to the British Museum. Two copies.—By B. H. HODGSON, Esq.

Proceedings of the Royal Society, No. 62 to 66.—By THE SOCIETY.

Proceedings of the Zoological Society of London, part XIII. 1845.—By THE SOCIETY.

Le Moniteur des Indes Orientales et Occidentales, No. II.—By THE EDITORS.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of April, 1847.—By THE OFFICIATING DEPUTY SURVEYOR GENERAL.

Ditto ditto kept at Kyook Phyoo during April, 1847.—By THE SUPER-INTENDENT OF MARINE.

Address of the most noble the Marquis of Northampton, read at the anniversary meeting of the Royal Society, on November 30, 1846.—By THE ROYAL SOCIETY.

The Journal of the Royal Geographical Society of London, Vol. XVI. part II.—By THE SOCIETY.

Philosophical Transactions of the Royal Society of London, for the year 1846.—By THE SOCIETY.

Account of an Excursion in search of Ancient Inscriptions and other Relics in India, by a field officer of the Engineer corps.—By THE AUTHOR.

#### EXCHANGED.

Journal of the Agricultural and Horticultural Society of India, Vol. V. part IV.

#### PURCHASED.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 200.

The Curators of the Museums presented their usual monthly Reports.



*Report of the Curator Museum of Economic Geology for May, 1847.*

I have been employed examining various matters in the departments under my charge during the past month, but some are not completed and others not worth reporting upon.

*Geology and Mineralogy.*

Dr. Spilsbury has sent us an additional supply of specimens of the ferruginous spherules described in my report of Sept. 1846, as possibly volcanic. I have put into a separate notice for the Journal the result of my examination of one of them, which appears to me to demonstrate that they have not been derived from organic bodies.

Col. Ouseley has sent us a further and an abundant supply of the remarkable fibrous limestone with impure chalk (for chalk it certainly is if we use the name without reference to the organic contents of the purer European chalks) described in my last, and both in a mineral and a geological point of view, it is highly interesting; the layer of matrix is in some specimens fully half an inch thick!

*Economic Geology.*

Major Jenkins has sent us from Assam a curious kind of beads held in much veneration by the Singphos. I have put it into the form of a short paper for the Journal, the examination I was able to make of the minute specimen we could afford to take, being about  $1\frac{1}{2}$  grain in weight, so as to preserve for the Museum these singular specimens for comparison. When we can obtain others a more complete analysis may be made and the question settled of whether they are artificial or natural productions. Dr. Spilsbury has sent us (Report of March, 1847) another, and this time a handsome specimen of the Copper Ore of Sahgurh\* which is really a very fine and promising one, being a pure green and steel-grey oxide, probably a silico-carbonate of Copper dispersed in spots and masses through a quartz matrix with very little iron and apparently no sulphur in combination. It is to be regretted that such a promising ore is not wrought, but the expense of carriage from such a spot would be a heavy charge even on the manufactured produce.

He sends also a bar of iron from Tendookhairie which, his note says "cannot be wrought for the copper," but the obstacle is not copper,

\* From Sowrage, Sahgurh Raja's present capital, 9 miles north of Dhumonee, and 32 miles south of Tehree.





1. *STEGOSTOMA CARINATUM*, n. s.; a. Portion of upper lateral ridge, nat. size.

b. Ditto, magnified. 2. *SCYLLIUM OCELLATUM*, (Gmelin).

which by the way would be volatilised in the heat required to smelt iron, but the sulphuret of iron which it contains, and the only chance of producing passable iron from the ore would be (perhaps) careful roasting of it; an expense which it would not support; I say, perhaps, not having seen the ore, for pounding and washing might with some earthy iron ores answer and leave the pyrites behind. And from some of the more compact and metallic kinds roasting would not separate the sulphur. Col. Ouseley has forwarded us a brick and a fragment from the Ramgurh temple of Sirgoojah but I have no farther notice of it than the name.

*Zoological Department.—Mr. Blyth's Report.*

The following are the donations which I have now the pleasure to acknowledge :—

1. From G. T. Lushington, Esq. of Almorah. A fine male of the Tibetan (slightly aberrant) Gazelle recently described by Mr. Hodgson by the name *Antilope (Procapra) picticaudata*, in XV, 334. I have had it mounted, and now exhibit it together with its female, presented on a former occasion by Dr. Campbell. On looking over the large collection of original drawings of animals, and of tracings of such, which I brought from England, I have been gratified to find a tracing of Pallas's figure of his *Ant. gutturosa*; from which I now feel satisfied that it is a distinct species from the *Gazella picticaudata*, however close the affinity in various respects: but I must be permitted to retain my expressed opinion that, until now, I could not have felt justified in considering them as distinct. *N. B.* The same bare places on the site of the sub-orbital sinuses are visible in the male specimen as in the female; as if a rudiment of such an organ had existed in the recent subject.

2. From Major Jenkins, Pol. Agent at Gowhatti—The skeleton of a Leopard, and skins of the *Bhaloo-soor* and of *Sciurus bicolor*; also the imperfect skin of a Pangolin.

3. From Capt. Rollo, 50th Madras N. I.—Specimens of the *Schizodactylus monstrosus*, and of its larva, preserved in spirit, from Vizagapatam.

4. From Major Ouseley, of Chota Nagpur—A skin and two perfect skeletons of male Gaours (*Bos gaurus*).

5. From Mr. Warden, of the Pilot service—A fine specimen of a Shark, being a second and new species of the genus *Stegostoma*, hitherto only represented by the 'Zebra Shark' of authors, No. XVIII of Russell's 'Fishes of the Coromandel coast.' It may be described as—

*St. carinatum*, nobis, (Pl. XXV, fig. 1). Structure typical. Remarkable for a series of ridges studded with enlarged scales (vide fig. 1, a), the most prominent of which commences abruptly on the vertex towards the occiput, and is conti-



nued over the spine and along the upper margin of the first dorsal fin, upon which it gradually diminishes till it disappears at the extremity of the fin; a similar ridge commences gradually behind the first dorsal, and in like manner ascends and gradually disappears towards the tip of the second dorsal fin: a strongly marked lateral ridge commences gradually, near and a little posterior to the abrupt commencement of the medial dorsal ridge, diverging from that slightly till it reaches as far as the posterior base of the first dorsal fin, then continuing parallel to the back, and expanding at the tail so as to merge and disappear among the scales of that organ, which are similarly enlarged: a second and less prominent lateral ridge appears about half-way down the side, scarcely traceable for some distance above and posterior to the pectoral fins; this continues parallel to the upper lateral ridge, and in like manner becomes diffused over and disappears upon the tail: lastly, another ridge appears a little behind the pectorals and is continued along the anterior margin of the ventrals; another again is continued along the anal fin; and there is a lateral ventral ridge, commencing gradually from near the posterior base of each ventral fin. All the scales are conspicuously carinated. The general colour is brown, spotted all over on the upper surface with moderately large but unequally-sized black spots, placed nearly in rows both longitudinally and transversely: these spots are smaller on the head, and disappear anteriorly to the eyes, being also comparatively indistinct on the two dorsal and the anal fins: the lower parts are spotless throughout. The spots and the ridges are exhibited in the accompanying plate, and also a portion of the upper lateral ridge (fig. 1, a), parallel to the commencement of the anterior dorsal fin, natural size, and the same magnified (b). Length of the specimen nearly 4 feet. The second figure in the plate represents an Australian species of true *Scyllium*, the *Squalus ocellatus* of Gmelin.

6. From our Librarian, Baboo Rajendralál Mittra,—The fresh laid egg of a Cassoway (*Cassuarius emeu*.)

7. From E. Lindstedt, Esq.—Some fine fresh specimens of sundry Snakes.

8. By R. W. G. Frith, Esq., I have been kindly permitted to select such specimens as were required for the museum of an extensive collection of mammalia and birds, chiefly procured in the vicinity of Malacca. The only species quite new to the museum are two birds—an *Accipiter*, which seems to be undescribed, and *Brachyurus cæruleus*, (Raffles, v. *Pitta gigas*, Tem.),—and one fish—*Osphronemus olfax*, Cuv. and Val., *Hist. Poiss.* VII, 282: but various other highly interesting specimens have also been selected, tending to complete our series of *Hylobates lar*, *Presbytis obscurus* and *Pr. albocinereus*, (Desm.), *Galeopithecus Temminckii*, *Paradoxurus leucomystax* (apud Cantor),\* *Lutra (Aonyx) barang*, and *Rhizomys sumatrensis*, among mammalia:

\* I differ from Dr. C. in considering this species to be *P. leucomystax* of Gray, from recollection of the original specimen in the Zoological Society's Garden, upon which the name was founded.

and in the class of birds—*Picus (Campephilus) validus*, mas, *Batrachostomus auritus*, jun., *Eupetes macrocerus*, Tem., and various others of commoner occurrence, among which may be mentioned the common Indian *Corvus culminatus*, which, though abundant at Penang, I had never before seen from so far south as Malacca, but in previous collections from that locality only the *C. macrorhynchos*, Vieillot, a very distinct species of black Crow. Upon the whole, this collection has added some valuable specimens to the Museum.

The Hawk can be satisfactorily identified with neither of the two described species inhabiting the Malay countries, viz. *Accipiter solöensis*, (Horsf., v. *cuculoides*, Tem.), and *Acc. virgatus*, (Tem.), to which Mr. G. R. Gray refers the *Acc. besra*, Elliot, of India.\* I shall designate it

*Acc. nisoides*. Presumed female in mature plumage differing only from that of *Acc. nisus* (common to Europe and India), in its much inferior size, being smaller than the male of *Acc. nisus*; and in having the throat streakless white, excepting a narrow median dark line; the usual lateral lines occur, but not conspicuously, bordering the ear-coverts beneath, which are observable in various other species of Hawks, Eagle-Hawks, &c. Length of wing  $7\frac{1}{4}$  inches, of tail  $5\frac{1}{2}$ ; tarse  $1\frac{3}{4}$  inch; middle toe and claw  $1\frac{1}{2}$  in.

June 2d, 1847.

E. BLYTH.

The usual display of stuffed animals that had been set up during the past month was exhibited; and after commenting briefly on these, Mr. Blyth proceeded to call attention to the rich collection of *Quadrumana* now in the Museum, amounting to above 100 specimens, either set up on wire, or to be thus mounted as soon as the Society's taxidermists could be employed on them. This series of *Quadrumana* was, for the occasion, ranged round the meeting room, and the Curator proposed to exhibit, in like manner, the series of other orders of mammalia and birds at future meetings of the Society; remarking that, from the greatly over-crowded state of the glass-cases, visitors to the Museum could at present but very inadequately appreciate the wealth of the Society's collections in these two classes more particularly, a considerable proportion of the specimens being, of necessity, concealed from view when piled one upon another in the glazed cabinets.

The following additional Report refers to the Society's present collection of *Quadrumana*.

\* Mr. Jerdon, in opposing this identification, regards my *Acc. nisoides* as the true *Acc. virgatus*; and certainly the *besra* does not accord with the descriptions of *virgatus*. The adult female *besra* is exceedingly like that of *Astur trivirgatus* in its colouring and markings; but the male is much more slaty above, and has much more rufous on the under-parts, than I have seen in adult males of *A. trivirgatus*. I am far from being satisfied that *Acc. besra* and *Acc. virgatus* are identical.

*Supplementary Report of the Curator of the Zoological Department.*

I beg to present the following memorandum on the species of *Quadruman*a at present in the Society's Museum.

The species of *Primates*, Lin., divide into what may be termed the *Cheiro-poda* and *Cheiroptera*, the former of which comprehends the subjects of this Report. The group first subdivides into what may be designated the *Anthropida* and the *Lemuria*.

The *Anthropida* falls into two primary divisions, respectively peculiar to the Old World and to the New World. These are the *Catarhini* and *Platy-rhini* of M. Geoffroy St. Hilaire. The former, among other characteristic distinctions, have constantly but two false molars on each side of both jaws: the latter have, as invariably, three.

The *Catarhini* next fall in to three well marked sub-groups.—1. That comprising the Human genus and the three genera of Apes, which have sundry anatomical peculiarities in common.—2. That composed of the Baboons and ordinary Monkeys of the Old World, with a simple stomach, and which are furnished with cheek-pouches.—3. That consisting of those numerous long-tailed Monkeys of the Old World which have a sacculated stomach, and no cheek-pouches.

The general appellation of *Quadruman*a applies to all of the *Cheiropoda* excepting Man. Our collection contains the following specimens, commencing with the Apes.

*Troglodytes niger*, Geoffroy. Of the Chimpanzee, we have a stuffed young male, standing 22½ inches high, forwarded by Mr. A. Bartlett, of London.\*

*Pithecus*, Geoffroy. The Orang-utans. Five stuffed specimens, besides skeletons, of all ages, from very young to full *xv*. Firstly, we have the mounted skin (deprived of one hand and one foot, which are preserved in spirit in the museum of the Linnæan Society of London), of the celebrated large adult (but not old) male procured in Sumatra by Capt. Cornfoot, who presented it to the Society, and which is described by Dr. Clark Abel in the 15th Volume of the 'Asiatic Researches,' and further noticed by myself in Vol. X, p. 837, of the Society's Journal. Secondly, the mounted skin and skeleton of a female (of the race termed *P. morio* by Prof. Owen), which lived 12 years in Calcutta in the possession of J. Apear, Esq., who presented it when dead to the Society, and was informed that the animal was six months old at the time it fell into his possession. In this specimen the dentition had

\* The supposed *Troglodytes niger* of Capt. Begbie's 'Observations of the Natural History of the Malayan Peninsula,' reprinted by Mr. H. E. Strickland in *Ann. Mag. N. H.* 1846, p. 395, refers to *Hylobates lar*: Capt. B.'s *Pithecus lar* being, apparently, *H. agilis*.



just been completed, or rather the third or last true molars were cutting the gums at the epoch of the animal's death.\* Our three other specimens are young of different ages.

Of the genus *Hylobates*, or Gibbon, we have a particularly fine series of specimens, though, with one exception only, they are referrible to but two species.

The exception is the fine pale female of *H. leuciscus*, F. Cuv. described in XIII, 465, which I procured with some other Javanese specimens at auction.

Of the Hoolock (*H. hoolock*, Harlan), we have seven fine mounted specimens, exemplifying the variation to which this species (in common with other Gibbons) is subject; besides a very pale living adult female with dark cheeks, throat, and chest, and white frontal band as usual, presented by Capt. Tickell: all the others are mounted from fresh specimens, received chiefly from the Barrackpore menagerie; but another pale adult female was presented alive by Mr. Heatly. Of the considerable number of individuals which I have now examined of this species, the males have been, almost without exception, deep black, with the white frontal band more or less developed, both as regards extent and the purity of the white: in general, but not always, this band is divided in the middle; and rarely it is of a dark grey colour, not contrasting very strikingly with the black. Females seem never to be of a deep black, but vary from brownish-black to whitish-brown, devoid however in the latter instance of the fulvous tinge which is observable in pale specimens of *H. lar*. In general, they are paler on the crown, back, and outside of limbs, darker in front, and much darker on the cheeks and chin. They are of every intermediate shade to the extremes mentioned; and do not appear to alter in

\* This valuable specimen arrived at the Museum at a most unfortunate time, when I was just recovering from a severe illness, and was passing my convalescence at the house of a friend at some distance, unable to attend office. Upon hearing of its presentation, however, I lost no time in repairing to the Society's rooms, but reached them too late for any useful purpose, beyond that of superintending the setting up of the skin. When the animal was alive, I often saw her; and she appeared to be always mild and good-tempered. The adult female Orang-utan which Sr. Del' Casse exhibited some month's ago in Calcutta, was a much larger and more powerful beast, and had quite a different expression of countenance. She was also, on the whole, good-tempered, but uncertain and dangerous to handle, which prevented my taking her dimensions. I consider her to be of the race termed *Mias Rambis* by Mr. Brooke. A remarkable trait of this individual was her decided sense of *pudor*: however she might lie or roll about, she never failed to use one foot for purposes of concealment, holding therein a small piece of board generally, or in default of this a wisp of straw, or whatever she could seize on for the purpose. The general colour of Sr. Del' Casse's animal was very dark, with much blackish hair pendent on the sides of the face, and the whole face was dark, excepting the eyelids.



colour through life. The *H. choromandus* of Mr. Ogilby is founded on a Hoolock of intermediate hue, in the collection of the Zoological Society. I may add that we have three skeletons of Hoolocks of different ages, one only being as yet mounted.

Of *H. lar*, the common Gibbon of the Tenasserim provinces and Malayan peninsula, (replaced in Arracan, Sylhet, and Assam, by *H. hoolock*,) we have as many as twelve specimens of all ages and colouring; for seven of which, from Malacca, we are indebted to Mr. Frith and Mr. E. Linstedt.\* The whole of these, and eleven other Malacca specimens lately received by Mr. Frith, are more or less dark, varying from deep brown to brownish-black, with the back generally paler (more or less so), and sometimes variegated with whitish patches: occasionally the rump is whitish in dark individuals: and the hands and feet are fulvous-white, rarely much suffused with brown. The white ring surrounding the face varies a good deal in development; in one of our specimens being almost obsolete, except on the chin: and some again have much more white on the chin and throat than others. The only pale specimen of this Gibbon which we possess from Malacca, is a very young male that was presented alive by Mr. McClelland:† but in the Tenasserim provinces, the pale variety seems greatly to predominate (if not to the exclusion of the dark varieties, at least in some localities). The Rev. J. Barbe presented us with adults of both sexes, together with the new-born young, and one a little older, from Ye; all being of a fulvous-white colour, palest in the old male; and another Tenasserim adult female, received from the Barrackpore menagerie, is of the same light hue. It is remarkable that while Mr. Barbe's smallest Tenasserim specimen, about the size of a Marmozet, is densely clad with long hair throughout, one of the same size (but still younger) from Malacca, has the belly and inside of the thighs entirely nude of hair, the throat, breast, inside of arms, and outside of thighs, very scantily clad, and the pelage of the head and back is very much shorter and less dense than in the other; a greater difference than so slight a disparity of age seems sufficient to account for: indeed, our young pale specimen from Malacca, though considerably older than either, is much less densely clad than the infantile Tenasserim specimen.

Of the Monkeys with a simple stomach, and cheek-pouches, the largest and most highly typical are the African Baboons. We have only a young specimen of

\* Mr. Frith has since favored us with another skin of a mature female, remarkable for having a small supplementary nipple half an inch below the ordinary left nipple.

† This was brought to Calcutta by Capt. Charleton, who had also pale adults from Malacca, and informed me that the pale race (which he considered distinct) kept in separate flocks from the dark race. Dr. Cantor has also pale Malayan specimens.

*Cynocephalus porcarius*, (Boddaërt.) The common Cape Baboon, procured dead from a dealer.

The most nearly allied Asiatic species constitute the division *Papio* apud Ogilby, which name is however assigned by Mr. Gray to the African Mandrill and Drill. Acknowledging the group as Mr. Ogilby established it, it seems that *Inuus*, Geoffroy (applied by that naturalist to the Magot of Barbary), has the best claim to be retained as its appellation. Two minor groups are comprised, viz. the *Silenus* of Mr. Gray, from which surely cannot be separated *I. arctoides*, *I. nemestrinus*, and *I. niger*; while *I. rhesus* is more allied to *I. sylvanus*.\* The Society's present specimens are as follow:—

*I. silenus*, (L.) Very fine examples of the male and female; the former purchased (dead), the latter received from Barrackpore. Also a fine mounted skeleton of an adult male. This species of Monkey is stated by all authors to be indigenous to Ceylon; but I have the authority of Dr. R. Templeton of Colombo for stating that it does not inhabit that island, though tame specimens are often taken there. In Travancore and Cochin, it occurs abundantly in a state of nature.

*I. arctoides* (? Is. Geoff.): described, with a mark of doubt, as *I. nemestrinus* in XIII, 473. Adult male, and a young specimen, from Arracan; presented by Capt. Phayre.

*I. nemestrinus*, (L.) Nearly full grown male, purchased (dead); adult female, presented by Mr. E. Linstedt; and the Society possesses the skeleton of an adult male, and also a living male. Common in the Malayan peninsula, Sumatra, &c.

*I. rhesus*, (Lin.): *Pithex oinops*, Hodgson. Specimens of large adult male, and of female with young at the breast, procured in the Soonderbuns; also a younger adult male; and a huge and monstrously obese male, of which the carcass was picked up in the public street and brought to the Museum. Common in the Bengal Soonderbuns, Assam, &c.

The name *Macacus* should apply typically to the *Macaque* of Buffon, and various allied species which are scarcely (if at all) separable from the *Mangabays* of Africa, to which *M. carbonarius* especially approximates, with its dark face and pale eyelids.

*M. cynomolgus*, (Lin.) Adult male, purchased alive: female, from Malacca, presented by Mr. Frith; ditto, from Ye, presented by the Rev. J. Barbe; young, from the Nicobar Islands, presented by Capt. Lewis; ditto, from Timor, presented by Mr. W. Benson. Common in the Malay countries.

\* Of the whole of the species here mentioned (excepting *arctoides*), I am familiar with the living adults.

*M. carbonarius*, F. Cuv. Living adult male, purchased : young, presented by Capt. Abbott. Common in Arracan, and quite distinct from the preceding species.\*

*M. radiatus*, Desm. Living adult male ; and stuffed specimen of a nearly full grown female, purchased (dead). Common in the peninsula of India, and replaced in Ceylon by the allied *M. sinicus*.

Of the African genus *Cercopithecus*, we have only *C. sabæus*, (Lin.), v. *C. chrysurus*, nobis, XIII, 477. A large old specimen ; and a younger one, from the Cape de Verd Islands, purchased alive.

We now proceed to the division of long-tailed Monkeys, with a sacculated stomach, and devoid of cheek-pouches, comprising the Asiatic genus *Presbytis* (vel *Semnopithecus*), and the nearly allied African genus *Colobus*. Of the latter we possess no example ; but of the former a tolerably rich series.

*Pr. entellus*, (F. Cuv.). Adult male and female, and two young of different ages ; procured in the neighbourhood. We have also skeletons of adults of both sexes, not yet set up. This, the *true* Entellus Monkey, or common *Hoonuman* of Bengal, I have never yet seen wild on the eastern side of the river Hoogly, and its absence has often been remarked on the Cossimbazar island (formed by the two chief confluent of the Hoogly and the main stream of the Ganges) ; while it abounds almost everywhere on the western or right bank of the Hoogly and up the Ganges, extending its range to Central India, and to Cuttack. I am assured also of its occurrence in Assam ; but have never seen a specimen from that province. This animal is of a pale sullied straw-colour, more or less tinged with a peculiar *chocolat-au-lait* brown on the back and limbs ; having constantly black hands and feet, and no trace of crest on the vertex. It is one of the commonest of Bengal animals, and I have never observed it to vary, so as to approximate in any degree to the following species.

*Pr. priamus*, Elliot, XIII, 470. The common *Hoonuman* of the Coromandel coast and of Ceylon, and which Mr. Jerdon informs me abounds, together with *Pr. hypoleucos*, in the vicinity of Tellichery on the Malabar coast of the peninsula of India. A nearly full grown female, presented by Walter Elliot, Esq. In this species, the pale *chocolat-au-lait* tint spreads over the whole back and outside of the limbs, to a much greater extent than is ever seen on *Pr. entellus* ; appearing also upon the crown, which exhibits likewise a compressed high vertical crest, resembling that of several of the Malayan species ; and the hands and feet are whitish, *i. e.* clad above with whitish hairs. The hairs of the pelage of this and of the two following species are straight, and not sinuous as in *Pr. entellus*.

\* I have been keeping both alive for these two or three years past, adult males ; and have seen and had several other live specimens of *M. carbonarius*.



Of *Pr. anchises*, Elliot, XIII, 470, I can only exhibit a skin sent on loan by that gentleman. This is the common species of the elevated table-land of the peninsula of India; and is remarkable for the great length of its hair generally, that upon its toes imparting the appearance of a Spaniel's paw.

*Pr. hypoleucos*, nobis, X, 839, XII, 170, XIII, 470 : *Semnopithecus Dussumieri*, Schinz : *S. Johnii*, var., Martin. An adult male, from Travancore, presented by Dr. W. Coles of Madras. This species abounds along the range of the Malabar ghats. Vide Pl. XXVI, fig. 1.

*Pr. albocinereus*, (Desm). Adult male, nearly full grown female, and small young; presented by R. W. G. Frith, Esq. : mature female, presented by E. Lindstedt, Esq. All from Malacca. In the preceding members of this genus, constituting with others a subgroup peculiar to India proper, the hair of the crown radiates from a centre, a little behind the brows: in the present Malayan species, there are two such centres, placed laterally near together; and the hair of the occiput is somewhat lengthened and *directed upwards*, terminating at the vertical crest which it aids to produce. Colour dusky grey-brown above, more or less dark, with black hands and feet, and white under-parts and inside of limbs, as also great part of the haunch and thigh externally: crown generally blackish, with admixture of white in the two radiating centres; and the upward-directed occipital hair is concolorous with the back, or somewhat paler. Tail generally blackish except towards its base. The small young resemble the adults, except in having a well-defined pale greyish band on each side, separating the dusky hue of the back from the white of the under-parts, and terminating in the white haunch. In this species, the eye-lids appear to form the only white portion of the face, the skin of the lips being dark.

*Pr. Phayrei*, nobis : referred to *Pr. obscurus* in XIII, 466, where described. Skin of an adult, presented by Capt. Phayre: two specimens of the young, presented alive by Capt. Abbot. Common in Arracan. This much resembles the preceding species in its colouring, but differs from it in many particulars. There are no radiating centres on the crown; but a much longer and less dense, thin and compressed, vertical crest: the occipital hair is not lengthened, and is directed downwards: the white of the under-parts scarcely extends upon the inside of the limbs, and spreads much less on the sides, which are dark like the back; and the haunches and thighs are uniformly coloured with the back: the whiskers also are dark, and very long, concealing the ears in front; whereas in *Pr. albocinereus* the ears are wholly visible: lastly, the tail is generally more or less albescent to near its tip; and the lips are conspicuously white, and well furnished with white moustachial hairs above, and similar hairs below. Vide Pl. XXVI, fig. 3.



*Pr. Barbei* (?), nobis, n. s. ? Adult male and female, from the Tenasserim province of Ye; presented by the Rev. J. Barbe. Intermediate to the preceding species and to *Pr. obscurus*; but seemingly, distinct from both. There is no vertical crest, as in the former; nor is the occipital hair lengthened and conspicuously much paler, as invariably in the latter species: but the shoulders and outside of the arm are silvered in both specimens; and the under-parts resemble those of *Pr. obscurus*. The tail is very slightly paler than the body; whereas in twelve adults of *Pr. obscurus* (lying together before me, at the time of drawing up this description), the tail is in every one much paler than the body. The size of the full grown animal is also considerably inferior to that of *Pr. obscurus*, and perhaps a little exceeds that of *Pr. Phayrei*. In the female specimen, there is a white space at the interior base of the thigh, more developed on one side than on the other. The pale markings of the face resemble those of *Pr. obscurus*. If a variety of either, however, (which I suspect it is not,) it should rather be referred to *Pr. Phayrei*.

*Pr. obscurus*, (Reid.) Adult male and female, newly born young, and one a little older; presented by R. W. G. Frith, Esq.: half grown male, and newly born young; presented by E. Lindstedt, Esq. All from Malacca. Of the three very small specimens, the youngest is entirely of a bright light fulvous hue, without any admixture of dark hairs: the second has a general slight admixture of dark hairs, which predominate on the forehead, vertex, and occiput, while the sincipita continue bright fulvous; the arms and hands, knees, shins, and feet, are as dark as in the adult: the third, but very little larger, is coloured as in the mature animal, except that the terminal three-fourths of its tail continue rufous; and some admixture of the same remains on the sincipita, throat, flanks, and exterior of thighs. In the half-grown specimen, an extremely faint vestige of this rufous is still traceable upon the tail only.

*Pr. Johnii*, (Fischer:) *Semnopithecus cucullatus*, Is. Geoffroy. Adult male, received dead from Barrackpore: and a female, from the Nilgherries, with very long hair on the head; presented by T. C. Jerdon, Esq.

*Pr. cephalopterus*, (Zimmerman, with numerous synonymes.) Full grown female, purchased alive: adult male, of a brown variety (not in very good order), from Ceylon; presented by T. C. Jerdon, Esq.

\* No trace, at least, is visible on either of the two dry specimens: but the taxidermist lad who prepared them asserts, very positively, that they had a thin raised crest upon the vertex, when fresh: and also that a young one was obtained alive, when the female was shot, of a pale rufous colour when of the size of the Society's two young specimens of *Ph. Phayrei*, which do not differ in colour from the adult animal

*Pr. pileatus*, nobis, XII, 174, XIII, 467. Adult male and female, from the interior of the Chittagong hills; presented by the Rev. J. Barbe: another adult male, from the Tipperah hills; presented by F. Skipwith, Esq.; and a female, from the Barrackpore menagerie. The males of this species seem always to be of a deep rust-colour on the cheeks, lower-parts, and more or less on the outer side of the legs; while in the females this rust-colour is dilute and weak. Pl. XXVI, fig. 2.

*Pr. maurus*, (Lin.) Adult male, purchased dead. Inhabits Java.

Of the great series of South American Monkeys, constituting the *Platyrrhini* of M. Geoffroy, we have only two specimens at present:—

*Callithrix sciureus*, (Lin.): and

*Jacchus vulgaris*, Geoffroy; *Simia jacchus*, Lin. Both inhabitants of Brazil, and presented by Mr. Bartlett.

Of the *Lemuria*, or *Strepsirhini* of M. Geoffroy, comprising the two families *Lemuridæ* and *Galeopithecidæ*, the following species of *Lemuridæ*.

*Lemur mococo*, Lin. (Old collection). Inhabits Madagascar.

*Nycticebus tardigradus*, (Lin., apud Raffles.) Three marked varieties, and a fourth which is perhaps distinct.—1. Javanese variety, *N. javanicus*, Geoff. Specimen from Java, presented by the Batavian Society. Colour fulvescent. Two strongly marked and defined dark bands, ascending from around the eyes, meet at the occiput, where another equally defined band crosses them from ear to ear: the united occipital band is continued along the back, and becomes gradually evanescent towards the short tail.—2. Malacca variety. Equally fulvescent with the last; but the white, ascending from between the eyes, in general much diminished in quantity: around the eyes dark; but no defined bands ascending therefrom, the summit of the head being of a uniform diffused rust-colour, in which the markings of the preceding variety may sometimes be faintly traced: the occipital and dorsal stripe sometimes well developed, not unfrequently indistinct. Three specimens; two presented by the Rev. F. J. Lindstedt, one having the dorsal band well defined, the other indistinct; the third, with indistinct facial markings as in the preceding variety, presented by R. W. G. Frith, Esq.—3. Bengal, Assam, Sylhet, and Arracan variety. In general much paler than the others, occasionally almost white: the ears and around the eyes dark, but rarely a trace of the frontal and sinicital bands; the glabellar streak, between the eyes, white and distinct; the frontal region uniformly albescent: specimen from Goalpara, presented by Dr. Thorburn: another, from Arracan, presented by Capt. Phayre: and a female and young from Tipperah, presented alive by F. Skipwith, Esq. This female is prepared as a skeleton.—4. Very deep-coloured variety (?), with remarkably short limbs; locality unknown. From the Society's old collection.

*Loris gracilis*, Geoffroy. Two specimens, presented by W. Elliot, Esq.; also a skeleton. Inhabits the Coromandel coast and Ceylon. A third mounted specimen was received from the Calcutta Medical College, stuffed: its locality being unknown. It is probably a distinct species; the ears are much larger and broader than usual, though apparently somewhat stretched; and the limbs are much less elongated. The skull of this specimen and that of *Nycticebus tardigradus* var. 4, have been taken out, and are now in the Museum; the specimens also have been re-stuffed, and their limb-bones examined: both were fully mature animals, the skulls presenting no peculiar distinctive characters; but the fore-arm of *Loris gracilis* var. (?) measures but  $2\frac{2}{3}$  inch, instead of fully 3 inches.

Of *Galeopithecidae*, we have—

*Galeopithecus Temminckii*, Waterhouse. Four Malacca specimens, of different ages, presented by C. Hufnagle, Esq., R. W. G. Frith, Esq., and the Rev. F. J. Lindstedt.

Such is our present collection of *Quadrumana*: and I think I am entitled to add, that only the following specimens existed at the time of my taking charge of the Society's Museum.—1. The Orang-utan skin presented by Capt. Cornfoot, since mounted on wire. 2 and 3. Half grown specimens of *Hyllobates hoolock* and *H. lar*, since replaced by better ones. 4. *Presbytis entellus*, half-grown, and since replaced. 5. *Cercopithecus sabæus*, since re-stuffed, and the skull taken out and cleaned. 6. *Lemur mococo*. 7. *Nycticebus tardigradus*, var. 4. Also the skeleton of an adult female small Orang-utan (imperfect), presented by Mr. Frith; skull of large male do; and skeleton of the *Semnopithecus maurus* apud Helfer, which is probably *Presbytis Barbei*. With a larger establishment, I should by this time have had a much more extensive collection of mounted skeletons.

The following are our chief Asiatic desiderata in this order, confining our attention to India and the countries adjacent.

From India proper, we require good series of all the different Monkeys that have been confounded under *Presbytis entellus*. Such are—*Pr. schistaceus* of the Himalaya, *Pr. anchises*, *Pr. priamus*, and *Pr. hypoleucos*. In fact, specimens of *Hoonumans* or *Lungoors* from any distant part of the country are extremely acceptable, as illustrating the precise distribution of the several species, and perhaps adding to their number.

We also require the *Inuus assamensis*, and *I. pelops* (the hill representative of *I. rhesus*), and the *Macacus sinicus* from Ceylon.

From Arracan, fine adults of *Presbytis Phayrei*; and from the Tenasserim provinces a living specimen of *Pr. Barbei*. Also good specimens, and living (if possible), of *Inuus arctoides*. From the Malayan peninsula and islands,

additional species of *Hylobates* and *Presbytis*, as especially *H. agilis*, *Pr. cristatus*, and *Pr. femoralis*, obtained in the peninsula by Dr. Cantor. Also the genus *Tarsius*: and, of course, any novelties that may yet be discovered in these countries: the Tenasserim provinces, more especially, having hitherto been very inadequately explored.

E. BLYTH.

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For all contributions and donations as above detailed, the thanks of the Society were directed to be conveyed in the usual manner.

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ERRATUM.—We are requested to state that the designation of M. E. Gibelin, recently elected a member of the Asiatic Society, is *Procureur General*, not *Procureur du Roi*, which is an inferior office.—EDS.

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*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of June, 1847.*

| Days of the Month. | Maximum Pressure observed at 9h 50m.           |                      |             |                                         |                      |                                                | Minimum Pressure observed at 4 p. m. |             |                                      |                               |                         |      | Run Gauges.<br>Elevation.<br>Feet Feet<br>40 4<br>Upper Lower<br>Inch Inch | Moon's phases. |
|--------------------|------------------------------------------------|----------------------|-------------|-----------------------------------------|----------------------|------------------------------------------------|--------------------------------------|-------------|--------------------------------------|-------------------------------|-------------------------|------|----------------------------------------------------------------------------|----------------|
|                    | Barometer re-<br>duced to 32° Fah-<br>renheit. | Temperature.         |             | Wind.                                   | Aspect of the Sky.   | Barometer re-<br>duced to 32° Fah-<br>renheit. | Temperature.                         |             | Wind.                                | Aspect of the Sky.            | Maximum<br>Temperature. |      |                                                                            |                |
|                    |                                                | Of the Mer-<br>cury. | Of the Air. |                                         |                      |                                                | Of the Mer-<br>cury.                 | Of the Air. |                                      |                               |                         |      |                                                                            |                |
|                    | Inches.                                        | cury.                | cury.       | Direction<br>from sunrise<br>to 9h 50m. |                      | Inches.                                        | cury.                                | cury.       | Direction<br>from 2.40 to<br>4 p. m. |                               |                         |      |                                                                            |                |
| 1                  | 29.540                                         | 90.0                 | 88.0        | 82.9 W.                                 | Cirrostrati.         | 29.428                                         | 95.2                                 | 93.0        | 82.5 S.                              | Cumulo strati.                | 96.0                    | 0.29 | 0.38                                                                       |                |
| 2                  | 550                                            | 91.0                 | 89.9        | 82.6 S.                                 | Cirrostrati.         | 465                                            | 96.5                                 | 95.0        | 83.5 S.                              | Cumulo strati.                | 96.6                    | 0.39 | 0.47                                                                       |                |
| 3                  | 562                                            | 88.0                 | 86.4        | 81.3 S.W.                               | Cloudy.              | 506                                            | 88.0                                 | 86.8        | 81.4 S.                              | Cumuli.                       | 89.2                    | 0.16 | 0.23                                                                       |                |
| 4                  | 567                                            | 90.0                 | 89.0        | 83.3 S.                                 | Cloudy.              | 480                                            | 97.9                                 | 95.4        | 85.5 S.                              | Cumulo strati.                | 97.8                    | 1.72 | 1.80                                                                       |                |
| 5                  | 519                                            | 89.0                 | 88.8        | 82.0 W.S.W.                             | Cloudy.              | 466                                            | 91.0                                 | 90.0        | 85.0 S.                              | Cloudy.                       | 92.0                    | ..   | ..                                                                         |                |
| 6                  | 548                                            | 85.5                 | 85.0        | 79.0 S.                                 | Cloudy.              | 463                                            | 89.0                                 | 88.4        | 81.5 S.                              | Cloudy.                       | 92.2                    | ..   | ..                                                                         |                |
| 7                  | 559                                            | 92.0                 | 90.6        | 81.0 W.S.W.                             | Light Hazes.         | 490                                            | 92.0                                 | 90.0        | 83.0 E.                              | Cloudy.                       | 95.1                    | 0.05 | 0.11                                                                       |                |
| 8                  | 615                                            | 80.0                 | 81.0        | 77.9 S. E.                              | Overcast.            | 499                                            | 92.3                                 | 90.8        | 81.3 W.                              | Haze.                         | 92.8                    | 0.04 | 0.10                                                                       |                |
| 9                  | 515                                            | 94.0                 | 91.8        | 84.6 S.                                 | Clear.               | 405                                            | 96.5                                 | 94.3        | 86.2 N. W.                           | Cloudy.                       | 98.8                    | 0.12 | 0.18                                                                       |                |
| 10                 | 498                                            | 92.5                 | 90.0        | 84.0 E.                                 | Cumuli.              | 413                                            | 89.5                                 | 87.7        | 82.0 E.                              | Cloudy.                       | 98.2                    | ..   | ..                                                                         |                |
| 11                 | 555                                            | 92.7                 | 89.3        | 82.2 S.                                 | Cumuli.              | 485                                            | 86.5                                 | 86.0        | 80.5 E.                              | Cirro strati.                 | 96.0                    | 0.31 | 0.35                                                                       |                |
| 12                 | 541                                            | 86.3                 | 86.0        | 82.0 N. E.                              | Cloudy.              | 432                                            | 88.6                                 | 87.0        | 80.1 S.                              | Cloudy.                       | 90.8                    | 1.04 | 1.12                                                                       |                |
| 13                 | 549                                            | 88.0                 | 87.0        | 83.0 S.                                 | Cloudy.              | 479                                            | 86.8                                 | 86.8        | 81.4 S.                              | Cloudy.                       | 91.0                    | 1.83 | 1.98                                                                       |                |
| 14                 | 596                                            | 79.5                 | 80.5        | 79.0 S.                                 | Drizzly.             | 497                                            | 87.4                                 | 87.0        | 82.0 S.                              | Cloudy.                       | 87.8                    | 1.95 | 2.30                                                                       |                |
| 15                 | 600                                            | 87.0                 | 86.4        | 82.2 S.                                 | Cumuli.              | 522                                            | 90.0                                 | 89.0        | 83.0 S.                              | Cumuli.                       | 91.0                    | ..   | ..                                                                         |                |
| 16                 | 660                                            | 83.0                 | 84.5        | 81.4 S. W.                              | Cloudy.              | 584                                            | 87.0                                 | 87.0        | 80.0 S.                              | Cloudy.                       | 88.6                    | ..   | ..                                                                         |                |
| 17                 | 647                                            | 89.0                 | 88.5        | 81.3 S.                                 | Cumuli.              | 572                                            | 90.0                                 | 89.0        | 81.0 S.                              | Cirro strati.                 | 92.3                    | ..   | ..                                                                         |                |
| 18                 | 623                                            | 88.8                 | 88.1        | 82.0 S.                                 | Cumulo strati.       | 509                                            | 90.5                                 | 89.3        | 80.8 S.                              | Cumuli.                       | 92.0                    | ..   | ..                                                                         |                |
| 19                 | 586                                            | 88.8                 | 88.2        | 81.5 S. (high)                          | Cloudy Cirro-Cumuli. | 477                                            | 91.5                                 | 90.5        | 83.0 S.                              | Cumuli.                       | 93.5                    | ..   | ..                                                                         |                |
| 20                 | 587                                            | 89.0                 | 88.5        | 82.0 S.                                 | Cloudy.              | 504                                            | 82.4                                 | 81.5        | 77.8 S.                              | Very cloudy, thunder-<br>ing. | 93.4                    | 0.10 | 0.17                                                                       |                |
| 21                 | 570                                            | 90.0                 | 87.8        | 82.8 S.                                 | Cirro Cumuli.        | 483                                            | 90.0                                 | 88.0        | 81.5 N. E.                           | Cloudy, thundering.           | 95.3                    | ..   | ..                                                                         |                |
| 22                 | 603                                            | 92.0                 | 90.0        | 83.0 S.                                 | Cumulo strati.       | 518                                            | 86.0                                 | 85.0        | 80.3 S.                              | Cloudy.                       | 91.8                    | 0.37 | 0.45                                                                       |                |
| 23                 | 637                                            | 85.2                 | 86.0        | 81.0 E.                                 | Cloudy.              | 554                                            | 86.0                                 | 85.3        | 81.0 S.                              | Cloudy.                       | 88.9                    | 0.66 | 0.73                                                                       |                |
| 24                 | ..                                             | ..                   | ..          | ..                                      | ..                   | ..                                             | ..                                   | ..          | ..                                   | ..                            | 86.5                    | 0.33 | 0.42                                                                       |                |
| 25                 | 673                                            | 88.4                 | 85.0        | 83.0 S.                                 | Cloudy.              | 577                                            | 82.0                                 | 80.8        | 78.9 E.                              | Rain, thundering.             | 91.0                    | 0.24 | 0.33                                                                       |                |
| 26                 | 647                                            | 90.4                 | 87.8        | 81.2 S.                                 | Cumulo strati.       | 555                                            | 88.9                                 | 88.2        | 81.0 S.                              | Cirro strati.                 | 92.3                    | ..   | ..                                                                         |                |
| 27                 | 636                                            | 91.0                 | 89.0        | 81.3 S.                                 | Cumulo strati.       | 582                                            | 91.7                                 | 90.5        | 81.8 E.                              | Cumulo strati.                | 93.0                    | 0.55 | 0.63                                                                       |                |
| 28                 | 580                                            | 90.0                 | 88.0        | 80.8 S.                                 | Cumulo strati.       | 488                                            | 90.4                                 | 89.5        | 82.5 E.                              | Cloudy.                       | 93.0                    | ..   | ..                                                                         |                |
| 29                 | 586                                            | 89.5                 | 87.0        | 82.0 S.                                 | Cloudy.              | 463                                            | 89.0                                 | 85.5        | 78.5 E.                              | Nimbi.                        | 92.0                    | 0.05 | 0.10                                                                       |                |
| 30                 | 597                                            | 92.5                 | 89.0        | 81.4 S.                                 | Cloudy.              | 510                                            | 90.9                                 | 88.8        | 82.0 S.                              | Cloudy.                       | 90.7                    | 0.08 | 0.16                                                                       |                |
| Mean               | 29.535                                         | 89.1                 | 87.5        | 81.3                                    |                      | 29.494                                         | 90.1                                 | 88.5        | 81.7                                 |                               | 92.7                    | 0.29 | 0.20                                                                       |                |

# JOURNAL

OF THE

# ASIATIC SOCIETY.

~~~~~  
AUGUST, 1847.
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*Notes on the Antiquities of the Districts within the Bhopal Agency,  
&c. by Capt. J. D. CUNNINGHAM, Engineers, Political Agent,  
Bhopal.*

I send you two packages of inscriptions, copied during a tour of the districts within the Bhopal Agency, which I have just completed. I trust that they may reach you in safety, and that the few I have set apart from the rest may be deemed worthy of publication.

The existence of a "Tope" near Bhilsa was known to myself as to others through the medium of the Asiatic Society's Journal, but as I had not the book by me at the time, I was not prepared to find so interesting and valuable a monument as I conceive this Tope to present. The whole country moreover, on either side of the upper Betwah and North and South of Bhilsa, is full of antiquities, and I am glad that I have had an opportunity of bringing some of these relics to your notice.

In describing the localities, or the buildings, or the monuments, which have furnished the several inscriptions, I may indulge in some speculation, and it is therefore but candid, although it is hardly necessary, to remind you of my want of scholarship and indeed of any deficiencies in every way, excepting, perhaps, in a proper degree of interest in the history of the country and of the creeds which its inhabitants have professed. My lucubrations however will not take long to read, and they may be suggestive to others.

*Bhojpoor.*—I will first refer to Bhojpoor as the most southerly, or as being higher up the river Betwah than the other places. Raja Bhoj, of the Powâr or “Puar” tribe, whose date or identity is doubtful, is however believed to have represented both the race and the power of Vicramaditya, and in this part of Malwa he is generally considered to have flourished in the fifth century of our era. The legend related by Sir John Malcolm (*Central India*, I. 25) is also in every one’s mouth, viz: that in order to mark his gratitude or his love, or to expiate the sacrifice voluntarily made by his mother of her own life in giving him birth, he was always bent upon accomplishing some good work, and that the brahmins prescribed the erection of an embankment which should arrest nine rivers and ninety-nine rivulets, probably with the view of providing irrigation for a tract of country lower down the river. A place was chosen close to where two of the main branches of the infant Betwah unite in order to pass through a narrow gorge about 18 miles to the south-east of Bhopal. The gorge in question was dammed across, as was likewise a hollow to the westward of the outlet. A large lake, or Thâl, was thus formed, which inclosed a low range of hillocks, still distinguished as “the Island” by the name of its present village “Deep” (Dwîpa). The lake would appear to have been sixteen or seventeen miles in length and about seven or eight miles in breadth, but after all the care and labour which had been expended, it was found that one stream was still wanting to complete the full number, and Bhopal, the Minister of the King, suggested the embankment of a ravine at the spot on which the city called after him now stands. By this means a considerable rivulet which rises south-west of Bhopal, was made to run south-easterly into the Betwah or into the newly formed lake, instead of north-easterly into the river at Bhilsa, as until that time it had done. It is to this day apparent that the rivulet in question has been forced from its original channel, and it forms now the real Betwah. The lake continued to exist until the erection of Malwa into a kingdom by the Affghan Ghorces in the 14th and 15th centuries, when it is related that Sooltan Hoshung lamented the loss of so much good land, and ordered the embankment across the Betwah to be destroyed. According to the common belief 360 villages now fill the bed of the lake of Raja Bhoj, and it is certain that the tract in question is one of the most fertile in Bhopal.



The remains of the embankment across the Betwah, show that it may have been about a hundred feet in height and perhaps three hundred yards in length at the top. The dam across the hollow is scarcely a mile in length, so that the place selected was in every way well adapted for the object in view. The artificial part of this dam may be about 30 feet high where most lofty, and it forms a roadway from fifty to sixty feet in width. The embankment at Bhopal still serves its original purpose. All three have been formed of a mass of rocks and earth heaped together, and faced with blocks of stone from 3 to 6 feet long by 2 or 3 feet wide and  $1\frac{1}{2}$  to  $2\frac{1}{2}$  feet thick, laid so as to form a considerable angle and to present a sloping surface on either side. The work looks gigantic, and although the sandstone blocks were procurable on the spot, the prodigality of labour bestowed, shows rather the material power of the prince than the scientific poverty of his engineers. To the careless observer the whole work may appear to be one of the many idle acts of which despotism has been guilty, and yet I imagine that among the ancients of Asia as of Europe, more simplicity of mind and singleness of object prevailed than among the moderns of either continent. I doubt not that Raja Bhoj's labourers and mechanics sympathized with the motives of their prince, and readily presented themselves to execute a work, which may have conveyed some religious merit even to them, and which it is more than likely the Raja commenced with his own hands while he exhorted the workmen to persevere by personal attentions and occasional donations.

Malcolm had heard that Raja Bhoj built a city on the banks of his lake, but it does not appear that he designed more than the erection of a temple, which was begun, but has never been completed. The temple stands on the hill at the southern end of the dam across the Betwah; it is surrounded by the houses of a small village called Bhojpoor, but the only other remains, are some rude shrines dedicated to modern divinities, a plain Jain temple containing a figure of Parisnath, about 20 feet high, and the remains of the foundations of slight walls showing the square outline of a building never completed or nearly obliterated.

The temple of Raja Bhoj is dedicated to Shiv or Mahadeo. Its base forms a square of about 62 feet, and it may be nearly as many feet in height. The external walls are about 10 feet thick, and the unfinished dome of elaborate workmanship, is supported by four pillars, probably



40 feet high. The entrance is on the western side, and you ascend to the door lintel and then descend into the temple. The passages between the massive pillars and the external walls are necessarily narrow, and the pillars themselves are inelegant in their proportions. The space between them is wholly occupied with the "Lingam," which, with its pedestal, forms a gigantic object nearly 25 feet high, and is an existing illustration of a passage in Wilson's Hindoo Theatre, to the effect, if my memory serves me right, that the "Saivas" had a god so big they were obliged first to build *him* and then his containing temple.

The Lingam with its sustaining altar or pedestal, has an elegant and imposing appearance. The Lingam proper is a cylinder, with a slightly rounded top, of 7 feet and 2 inches in height by 5 feet 3 inches in diameter. It rests upon a single block  $19\frac{1}{2}$  feet square by  $3\frac{1}{4}$  feet in thickness, the upper surface having a channel parallel to the four edges, to carry off the water of oblations. The "die" or body of the pedestal or altar is about seven feet square in section, but the accompanying elevation, drawn partly from memory, will give you a truer idea of the whole work than any description, although it cannot be quite accurate in details, and the proportions are certainly not so perfect in the drawing as I conceive them to be in the original. The pedestals of many Lingams are indeed almost faultless in their proportions and in the beauty of their ornaments, and at Bhojpoor greatness of dimension is added to perfection of form.

The temple was never completed, and partially hewn stones, or blocks rough as they were quarried, are still lying on the summit of the sandstone hill within three hundred yards of the building. One of these blocks is the half wrought "Kullus" or keystone of the dome, which measures eleven feet square by five feet in thickness. A ramp of earth and rubbish abutting against the eastern side of the temple still remains, to show the simple and efficient, if not very ingenious means, used for raising heavy blocks to the summits of buildings.

No formal inscription has been found, and as the temple was never finished it is probable that none was ever recorded. The inscription in five lines, now sent, is cut on the jamb of the doorway, and is probably the work of some pilgrim. The characters, although rudely executed and somewhat different in form from those now in use, are still legible, but the language is not understood by any Pundit in this quarter. You

will observe that two dates occur in the inscription, the first "159" and the second "136," and as in bad or hasty writing, an Indian "seven" resembles a "one," I mention particularly that in reading the original this similarity has been held in view. The two inscriptions on the step and lintel of the doorway do not seem to be deserving of any notice.

On the pedestal of the Lingam are cut in well formed letters, the Sanscrit words "*achinted deoj*" signifying "*the sign of the Incomprehensible*,"\* of which a transcript will be found among the inscriptions. It seems to me that this short sentence should teach us much, and I have long thought that "Saivism" may yet be found to have once been, if it is not now, purer and more simple faith than is commonly supposed. I would discard a Phallic correspondence and all recondite regenerative meanings, as showing subsequent constructions rather than original design or import.† The peasantry of the wilder parts of India, still use a smooth pebble, or rounded blocks as the mark of the Divinity, or rather as a point of direction to their senses, and they will draw a trench round it on its sustaining altar of stone or tempered earth, to let their oblations of water run freely away, without even considering that they had formed or were worshipping the symbols of reproductive energy. "Ling" in its primitive acceptation means merely, a sign, a mark, and so little do the mass of worshippers know of what we consider its philosophic import, and so dull are their minds or so gross has their idolatry become, that in these days the plain pillar must often be shrouded in a case representing a human countenance, to convince them more certainly of the existence or place of the God. When the Brahmins quitted the Ganges, such of the tribes of Southern India as were not wholly barbarous, probably professed one form or other of Buddhism, with its ceremonies, and its images, and its indistinct apprehensions of a Divinity, and the new conquerors, may we call them Unitarians or

\* These words have been separately read by another person as *achuteddeoj* or "the mark of the everlasting God." There is little difference in the writing and none in the meaning so far as regards the argument in the text.

[The inscription on the Lingam is अचिन्त्याध्वज, *Achñtīya dhvaja*; and on the right jamb of the door, ऽरा श्रीमाधवसुतजोक्तुं प्रणमति "Salutation to the son of Madhab." —Eds.]

† Did an Athenian Magistrate or a Roman Matron, think of "*phalloi*" as emblems of fecundity or of reproduction, when the one allowed them to be borne through the streets during Dionysian festivals, or when the other tied them round the necks of her children as charms against evil?

only Monotheists? perhaps endeavoured to purify the faith of the learned by insisting on the existence of a God, and to sublime or exalt the superstition of the multitude by substituting a simple sign or mark for the representations of men and beasts, or by teaching the mere "Fetichists," that their plain black stone or block of wood, should lead them to think of the invisible ruler of the universe. I would thus regard "Vedantism" as the philosophical, and "Saivism" as the political or social, the theologic or theogonic, aspect of the genius of Brahminism. The worship of Kalee, or "Saktism" in general, similarly marks the superstitious phase of the old Hindoo mind, for the rude still every where propitiate the dread Goddess of famine, pestilence, and death, while I would regard the Vaishnuvee sect as representing the compromise of Brahmanism with Buddhism of the unity of God with the multiplicity of his powers and the variety of his aspects. This view admits of a civilization of the Southern and Western Coasts of India, and of the existence of a consanguineous race from the Ghats to the Himalayas, before the rise of the Brahmins, who with their warlike Kshutrees may have originally emigrated from Central Asia, but who during a long sojourn on the banks of the Ganges, had a form and direction given to their latent energies which made them the Greeks of the East, the Achæans of the wide spread Pelasgians of India, and which also rendered their civilization eminently national and characteristic. Buddhism may have been imported or adopted from Egypt and Babylon, but Vedantism is the native product of the mind of the dwellers on the Ganges with some intermixture of Mithraic traditions.

*Raeesén.*—Raeesén is a double-walled fort standing on a hill nearly isolated, and situated between Bhojpoor and Bhilsa. It was formerly the possession of a Tooer Rajpoot family of some local repute. Baber proposed marching against it, Akber made it the head-quarters of a "Sircar" or Zillah, but Aurungzeb afterwards removed the establishments to Bhilsa. Neither the Hindoo nor the Mahometan buildings are of great extent or merit, neither does the inscription appear to establish any thing of moment, although the date 1582 Sumbut serves to show the degree to which power had there been recovered by the Hindoos of Malwa.

*Bhilsa.*—Bhilsa is situated about half a mile from the right bank of the Betwah or Behterwantee River. Its ancient name is stated to have



been Bhudráwat, and it is related that the Pandoos gave battle to the then Raja, in order that they might obtain the white horse with the black ear to enable them to perform the "Uswoomed" sacrifice and to challenge the supremacy of India. The horse was stabled upon the precipitous rock of "Lohanghee" to the eastward of the town, and the Lord of Bhilsa had to yield it to his conquerors. On the opposite bank of the Betwah is still to be seen the site of a town known as Beisnuggur, and there is still a tribe in this part of India called the Beis or Beius, which claims to be Rajpoot. The present walls of Bhilsa are said to have been built by a Bheel Chief, and the name may possibly show it to have been the seat of a tribe, which has been pushed further to the westward within the historical period.

Bhilsa itself contains one edifice only of any note, viz : a mosque of rude workmanship built on the site of a "Beeja (Vijáya) Mundur" destroyed by Aurungzeb. From the fragments or portions of this temple which are still visible it would appear to have been a very elaborate work. The mosque is only curious, as a building, from its two minarets which are each formed by clustering together four pillars of irregular bases so as to form upon the whole two sides of a square in plan. The minarets are nearly destroyed, and the building suffered somewhat during the Mahratta wars from the ill directed fire of Ameer Khan's cannon. The inscription which accompanies this, is to be seen on a stone built into the wall of a narrow passage.\*

*The "Topes" near Bhilsa.*—The "Topes" and other Buddhist remains at Satcheh Kanekhera about  $4\frac{1}{2}$  miles to the south-west of Bhilsa, are however the monuments which give to that place its chief antiquarian interest. To these may be added the "Topes" at Peepleea, Bijolee, six or seven miles south-east from the two and the Vaishnuvee sculptures at Oodehghir about a mile and a half west of Bhilsa and nearly double that distance north of the Satcheh "Topes"

The two Topes at Satcheh were visited in 1819 by Captain Fell, [see Journ. As. Soc. for 1834, p. 488, &c.], when they were in better preservation than they are now, for an opinion confidently expressed by that officer, that they contained chambers or were not solid, led to two attempts to excavate them on the part of amateurs or antiquaries.

\* The words of the Inscription are read, but the language is not understood, by the Pundits here; some terms or words seem to be pure Sanscrit.



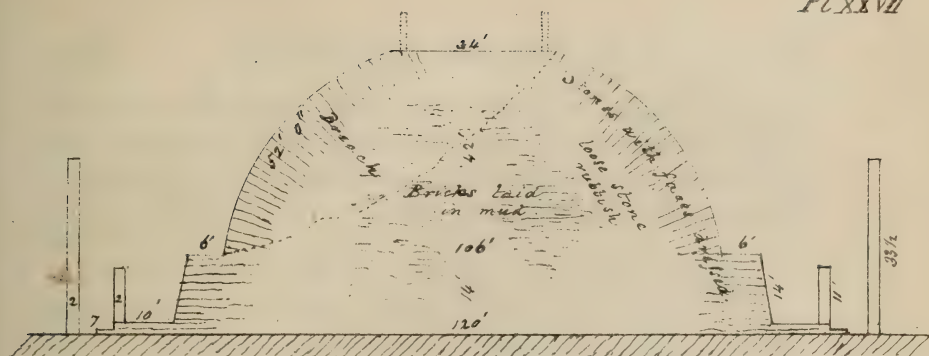
Instead however of driving small galleries at nearly the level of the ground into the interior, the explorers began digging pits as it were into the buildings, from the top or at about half way down the side, and as the stones used in the construction of the hemispheres were not cemented with lime, a third of one monument and a fifth portion of the other have been destroyed. Falling rubbish has upset or buried stone colonnades and the searches for coins or inner chambers do not appear ever to have reached the bottom of either Tope.

The two Topes in question are commonly known as the "*Sass-bhow ka bitha*" or as the "wife's and good mother's dung stacks," from their supposed resemblance to heaps of dried cowdung cakes. The word "Tope" is wholly unknown in this part of India, although it is the representative of a Sanscrit original.

The Buddhist monuments at Satcheh are built on three platforms or stages, and stretch east and west across a low range of hills. The highest portion of the highest platform, the edge indeed of a precipice, is occupied by a temple containing an image, and flanked on either side by rows of chambers. This uppermost stage seems moreover, for the most part to have been covered with buildings or cells used by the members of the religious establishment at the place. The centre nearly of the middle platform is occupied by the larger Tope at a distance of about 140 yards from the temple or shrine already mentioned. The smaller Tope is at a somewhat greater distance from the larger Tope, and occupies the third or lower stage which however has never been completed or properly cleared.

On the upper and middle stages there are several small temples or shrines, some of which still contain images of Buddha mostly of the kind which represent him as seated on the lotus-adorned throne. Some figures have a light drapery which does not conceal the shape, and in some the halo which usually invests the head is carved to resemble the expanded hoods of snakes. The shrines themselves are all flat-roofed, and not of the ordinary "*Chaitya*" or "*Degopa*" type with which the labours of Mr. Hodgson have rendered us familiar. On the central stage also are remains of what seem to have been small Topes, and indeed in one instance a regularly built circular wall is plainly discernible.

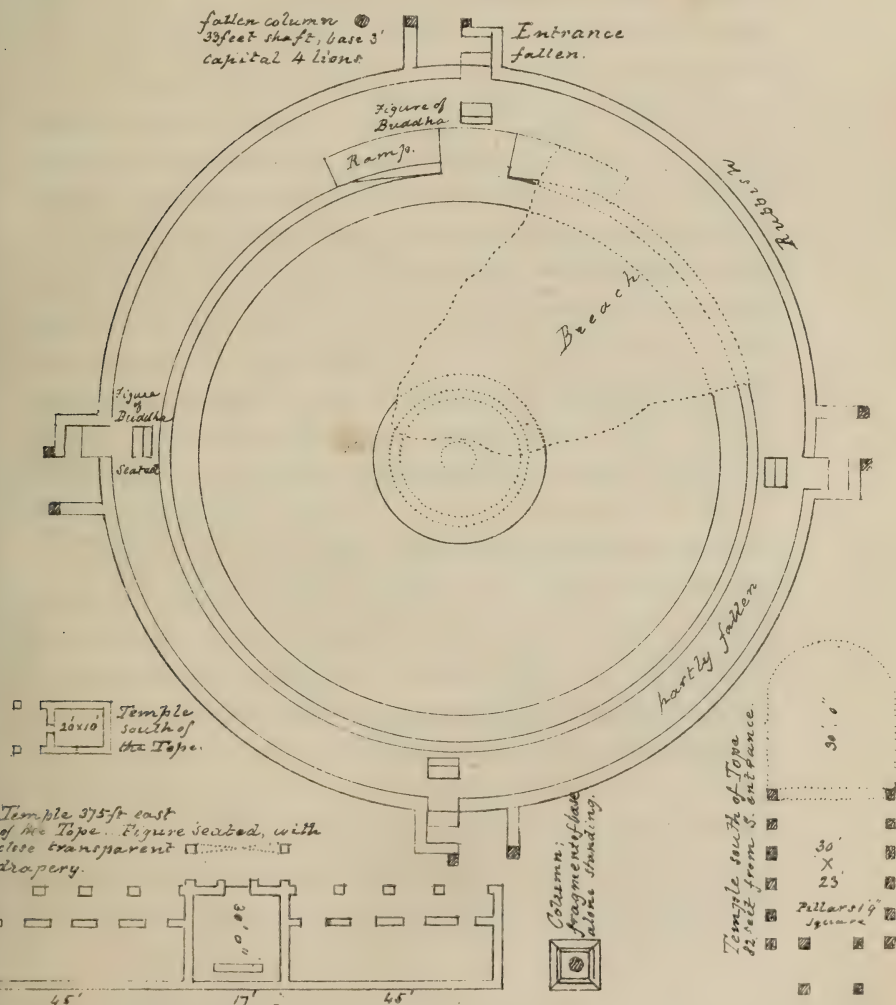
The larger Tope has a circular base 120 feet in diameter, according to a rough measurement. The basement is 14 feet high and it slopes



Vertical Section, Bhilsa Tope.

fallen column  
33 feet shaft, base 3'  
capital 4 lions

Entrance  
fallen.



Capt J D Cunningham del.

J.M.L.



one foot in that height. A berm or pathway of six feet is then left all round and form this basement springs the "Tope" itself with a diameter of 106 feet or thereabouts. Its height is 28 feet, or including the basement 42 feet; the hemisphere is not perfect if indeed any such geometrical figure was ever intended, and the top forms a circular flat of 34 feet in diameter. The Tope is encircled by a stone colonnade, or rather railing or balustrade 10 feet high, at a distance also of 10 feet from the basement while at opposite sides, corresponding with the cardinal points, are four entrances into the passage formed round the monument by the railing in question. Within the passage, and opposite the entrances are images of Buddha with their backs to the basement. The image at the southern entrance is erect, i. e. it has been cut in an erect position; and opposite the southern entrance also are ramps or slopes leading up to the berm or pathway. The Tope was originally surmounted by a kind of cupola, or at least by a circular railing of stone supporting one large central ornament or "Kullus," but the exact description of the upper work cannot now be ascertained. It further seems certain from fallen remains that the pathway surmounting the basement had a balustrade of stone on its outer edge about two feet high. The Tope was apparently built solid, a thick column or shaft of brickwork being first raised, to serve probably as a foundation for the upper cupola, and then encompassed with stone work, the outer blocks having their faces dressed, although they were not jointed with lime. The whole building was then cased in mortar to a thickness of about four inches.

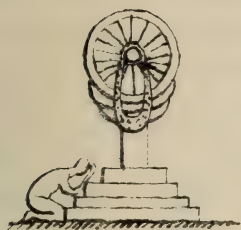
The smaller Tope corresponds in plan with the larger, but its lower base is only about 48 feet in diameter and its upper about 37 feet. The ramp also leading to the pathway above the basement is opposite the eastern entrance instead of the southern, and the lofty gateways in the encompassing stone railing which distinguish the larger Tope are wanting in the smaller. The accompanying plan and section of the larger Tope will however sufficiently illustrate the characteristics of both buildings.

Adjoining the northern and southern entrances stood two columns of stone, and perhaps more. One of these is about  $2\frac{1}{2}$  feet in diameter at the base, and the other about 3 feet, with a shaft of a single block 33 feet in length. At the southern entrance there would indeed appear to

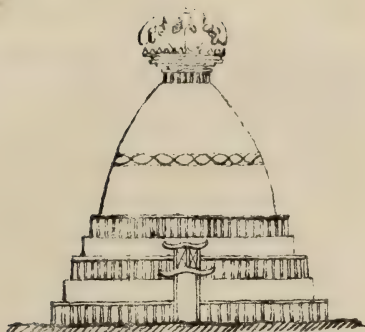


have been a second column close to the first, as the segmental fragment of one still protrudes two feet out of the ground. Adjoining the eastern entrance there is likewise a small pillar now standing with a base one foot in diameter and a shaft 13 feet long, and it seems probable that many similarly detached pillars formerly adorned the building. The capital of the southern column is formed of four lions, but a fallen capital on the northern side is of a kind which seems to have once been so much in use as to have formed the characteristic of a style. It consists of a bell-shaped stone, fluted, and surmounted by an "abacus" so thick as to be almost cubical. The style of the capital will however be best understood from the accompanying drawing. On neither of the capitals do there appear any marks as if they had sustained images of men or representations of the sun. They may nevertheless have done so, as the cup-shaped top formed by the lions' heads in one instance, and the broad basis furnished by the square "abacus" in the other, would leave a heavy stone figure in little need of support from tenons. On a pillar still existing in the same tract of country and on the representations of others, men or animals or a circle, i. e. the sun, surmount the capitals.

In an architectural and perhaps in an antiquarian point of view the most remarkable portions of the monuments are the stone railings or inclosures, and the pillared gateways with triple architraves. The railing consists of stone uprights or columns, 2 feet by 1 foot 9 inches in base and 8 feet 8 inches in height, and only an inch or so more than two feet apart. A plain architrave, as wide or thick as the uprights, two feet four inches deep, and slightly rounded at top surmounts the columns. Between the columns again are three cross pieces likewise of stone, two feet one inch or so in length, besides the supporting ends or tenons, two feet four inches in depth, and 9 inches thick, but their section is elliptical or doubly sigmental, that is the perpendicular axis is 2 feet 4 inches and the vertical 9 inches. Between each bar or cross-piece there is a space of four inches only, so that the inclosure is almost in effect a dead wall. The railing however must have been felt to be characteristic or symbolical, and it occurs frequently as an ornament among the sculptured reliefs. The abacus also of the capital of the column at the northern entrance has been carved so as to represent this species of inclosure.



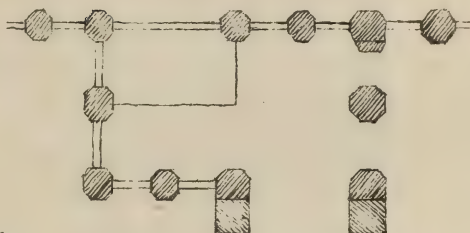
From the sculpture on the  
bases of the pillars enclosing  
the smaller tope.



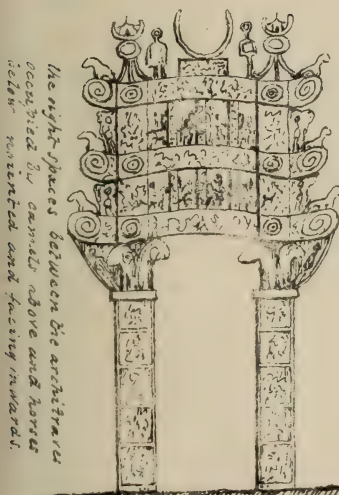
Elevation of a tope, as  
copied from one of the  
entrance pillars.



Elevation of stone enclosure; the cross-  
pieces double segments of a circle



Plan of an entrance.



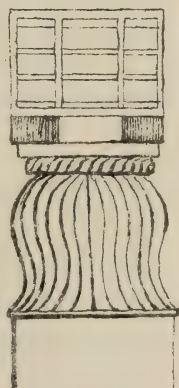
The right spaces between the arches  
occupied by a canopy above and horses  
below mounted and facing inwards.



pyramid with flames  
issuing from entrance.  
(from beliefs of large tope)



Standard  
or ensign.



Capital of column  
separate from, + V. of tope.

Elevation of an entrance to the tope.  
the capitals of the columns may be  
elephants, or lions, or dwarfs.



The entrance gateways are formed of two pillars without bases, seven feet apart, two feet three inches square in section, and including the capitals, eighteen feet four inches in height. On the capitals rest an architrave nearly two feet square in section, and which projects about four feet three inches beyond the pillars on each side. The architrave rises slightly in the centre, and the ends are also somewhat turned up, and carved so as to represent volutes or scrolls. Over the capitals, the architraves somewhat thicken, so as to support continuations of the columns. A second architrave thus lies parallel to the first at a distance of about three feet. It is not quite so long or projecting as the lowest, and a third architrave is still shorter than the second. On the ends of the architraves are seated lions, and between the architraves are figures standing, or seated on elephants, or camels, or horses. The pillars, so to speak, terminate in tripods supporting globes, which again sustain a kind of crescent encircling an ornament. Upon the centre of the topmost architrave rests a large crescent, if indeed the circle was not originally complete. The crescent is five feet high, which gives a total height to the gateway of 33 feet 6 inches. The capitals of the columns are formed in one instance of lions, in another of human dwarfs, and in two instances, I think, of elephants. From the astragals, or from the necks of the capitals, stretch female figures to the ends of the architraves. The columns, except where they abut against the stone inclosure, are elaborately ornamented with flowers, or human or animal figures in relief, or with representations of trees and temples, of religious ceremonies, and occasionally of the practice of mechanic arts. A detached gateway, which probably formed an entrance into the cleared area or platform, is similar in style and ornament, but not so large in size.

These gateways are not displeasing to the taste, although the superstructure, seems too heavy for the baseless columns. The bas-reliefs, which give the human figure a height of six or seven inches, show some fancy in design and some skill in execution. They surpass the ordinary productions of the present day, without being equal in accuracy of proportion or excellence of workmanship to what may be seen in some brahminical temples, or to the works at Ellora or Adjunta as given to us in drawings.—Their value however consists in what they make known about a former people, and while it would be idle to attempt to describe



the subjects treated of in the many compartments, I may make a few observations on matters of some interest which they help to illustrate:

There are several representations of "Topes," mostly with one terrace, such as that actually existing—but one at least shows two terraces. Each "Tope" is surmounted by a circle of stone pillars, on which again rests a succession of architraves projecting one beyond the other so as to give a greater breadth at top than at bottom. From this highest platform again rises usually one "Chutree" or umbrella, but sometimes three are seen to spring from it. The stone inclosures round the basement, correspond exactly with that still existing—and the terraces with balustrades show that they could be reached, and indeed that they were formed for purposes of circumambulation. The crowning stone inclosure could also probably be reached by some temporary means of ascent—for there is no sign of any winding pathway round the building, either in the existing "Topes" or in the representations given in the reliefs. Nevertheless I think the Tope of Manikyala in the Punjab has such a spiral ascent.

With regard to religious ceremonies or opinions, the reliefs give representations of the adoration or consecration of Topes—of the adoration of trees and of the devotion paid to the sun.—Men and animals, wild beasts and tame, come separately, or crowded together to offer up prayers at a "Tope"—or to bow to a tree growing out of a square or circular vessel or urn, or to adore the sun, resting the edge of its disc on the capital of a column. There are likewise images of Buddhas seated, male, and in one or more instances female, to whom perhaps some are offering worship. There is moreover a representation of a boat with a raised prow terminating in a lion's head, and a raised stern ending in a fish's tail, which contains an oblong seat or altar with a conopy. Two men stand by the side of the altar, one with a "Chowree" and the other with a "Chatta" or umbrella. If the altar is simply a seat, it is not at least represented as being occupied. In every direction the hooded snake—or at least the hood alone is to be seen veiling or sheltering or protecting the worshippers of the tree and the sun and the temple. Winged human figures are also to be seen as if hovering round a temple to guard it—and monkey-men, and monsters with human bodies and the heads of beasts, are occasionally seen side by side with ordinary mortals. Lastly, a square based pyramidal "Tope"

with a regular inclosure of pillars has four doorways with pointed arches, out of which are issuing flames. Nowhere did I notice a figure invested with the thread of the brahminical faith.

With regard to race these sculptures show that the dominant people was in dress and in many usages such as we may consider the old Hindoos, whether Brahminists or Buddhists, to have been. Another class however is also shown wearing a short tunic and a kind of cap, and who for the most seem to be engaged in menial offices or mechanic arts.

Among the animals represented, the elephant, the camel, the horse, the ox and the lion, are the most conspicuous. Birds and fishes and snakes are likewise shown. Among the birds, the peacock is prominent. Of the monsters represented are dragons, winged lions with beaks, horned and cloven-footed elephants; elephants terminating in fishes, centaurs mounted, and human bodies sustaining the heads of dogs or asses. The human portions of the centaurs seem female. Most of these fanciful or mythological animals are to be seen on the inclosure of the smaller "Tope," every pillar having three basses or circular spaces ornamented with reliefs of men or beasts or trees, &c.—It is to be observed that a Tiger nowhere appears, and that lions with bushy manes are frequently depicted. Sometimes they may be seen carrying away horned cattle smaller than themselves. Elephants, camels and horses are all used for riding, while chariots may be seen drawn by horses and containing an armed man with ensigns borne before him. Bullocks are likewise represented drawing cars.

The condition of life, or the degree of civilization of the people, may be further judged of by the representation of buildings with arched cloisters or colonnades, and with terraces and balustrades, or with balconies containing several people seated. The recurrence of water in waves with boats and with fish gambolling about would almost point to a maritime people, or to artists to whom the sea was familiar.

The inscriptions\* which are now forwarded are all cut here and there upon one part or other of the stone inclosure, excepting one, which is fragmental only, and which is visible upon the remains of a column at the southern entrance. None may be contemporary so far as we have any fair reasons for concluding, except *probably* two and *possibly* a

\* Most of these have been published in the sixth volume of the Journal; such as are new will be given hereafter.—Eds.

third. The two in question are cut on the representations of "Topes" sculptured on the southern entrance which has fallen, but which when standing had the representations in question out of the reach of pilgrims and visitors. The third inscription occupies a band between two compartments on one of the pillars of the eastern gateway, and could not readily be reached. The two longest inscriptions are cut on the stone parallels or cross-bars of the inclosure, and could be removed for transmission to Calcutta without injury to the monument, except such as would arise from their absence.

The temple close to the eastern entrance to which Captain Fell alludes [*Journal As. Soc. of Bengal.* III, 493] is now wholly in ruins, and I did not notice the Sanscrit inscription giving the date of 20 Sumbut. I regret that Captain Fell's paper was not before me at the time, otherwise the search I should certainly have made might have recovered so valuable a record. I may here observe that Captain Fell's measurements of the circumference and height of the monument should be more accurate than mine, as it is now somewhat ruinous. I am sorry however that our measurements of some details do not agree better than they appear to do.

The Topes at Peepleea-Bijolee do not appear to have been before brought to notice. Three of the most conspicuous stand on the sloping top or back of a low hill, and seven or eight or more, nearly in a line, occupy a lower stage on the same hill. Between two of the upper Topes there is a square platform of earth and rubbish 18 or 20 feet high,—supported by walls of masonry, and ascended by means of a ruinous flight of steps, on which stand the remains of a small temple containing a statue of Boodha surrounded by numerous emblematical figures, and among them, two of men wearing the thread of the twice-born Hindoo classes. The largest of the Topes in question does not appear to exceed 60 feet in diameter. All have a plinth or basement, from which springs the Hemisphere, and all have ramps by which the berm or pathway formed by the plinth may be reached. They appear to have stood within square courts, but there are no remains of circular inclosures of stone with the ornamented entrances which make the Satcheh Tope so remarkable. All of these Topes are more or less ruinous, and there are several heaps of loose stones which once probably formed small Topes. No inscriptions were any where observed.



It seems now to be certain that "Topes" are temples rather than tombs, and every thing I have observed of their structure, or which can be gathered from the representations given of them, corroborates this view of their use or purpose. They may nevertheless have occasionally been raised over the dead,—or some, like the gigantic one still existing at Unrodhpooa in Ceylon, may have contained such small and straggling chambers for the reception of funeral urns as are traceable in the pyramids of Egypt for the deposit of mummies. Their primary connection was however with the worship of the Divinity as then practised—and a consideration of their structure, and a comparison of the usages of the Jains, all show that a "Tope" was intended to represent Mount Meru,—the central mount of the world, the native seat, or point of divergence of the Caucasian races with its four shadow-giving trees,\* and four divergent rivers† which watered the earth. The Jain temples still contain models of towers, square or round, standing in inclosures, and diminishing by successive stories with balconies. These towers the "Juttees" or Jain priests declare to be symbolical of Meru, round which pilgrims should solemnly walk with their right hands to the mount. Circumambulation is still a ceremony of the Hindoos, more particularly during the Deewalee, or festival of light, at the temple on the fabled hill of Goverdhun near Muthra :—further, the holy hill of Gungree, the source, as is believed, of the Indus, the Sutlej, the Gogra [or Ganges] and the Burrampooter, is still, as I often heard when in Tibet, encircled by Lamaic pilgrims; the construction of the Topes admits of or provides for worshippers moving round and round them :—the Jains now perambulate within the square areas of their temples and draw Parasnath on certain occasions on his elephant or car through the inclosing cloisters, that is round the square court, and lastly the Buddhists of Tibet similarly pass round and round the oblong structures of stone which are found near every village.

The worship of the tree which occurs so frequently among these sculptures has left its traces in the regard still paid by Jains and Hindoos to the Burr and Peepul trees, or especially to the Burr, the Peepul and the Awnla when growing together. To this devotion may also be referred the circumstance that no Hindoo will ever cut down or

\* Jamun, Kuddamb, Burr, Peepul.

† Seeta, Bhudra, Chuksoo, Aliknunda.



injure the tree of his birth or life, that is the tree dedicated to the day on which he was born, and which trees are made 27 in number, to correspond with the mansions of the Moon.

The worship of the Peepul and the superstitious regard paid to the tree of birth, lead the mind back to the Biblical injunctions about the tree in the midst of the garden, and the vessel containing the altar as represented in the sculptures, is almost a counterpart of the ark or sacred boat of Egyptian processions, and which has served to illustrate the ark of the Jewish covenant, except that waving punkahs and chowrees, the marks of dignity and respect, take the place of the overshadowing wings of angels or cherubim.

The actual worship of the serpent is not apparent among these reliefs, but their hoods every where protect worshippers, and snakes themselves sometimes seem the companions of devotees. Nevertheless on the smaller Tope there is a representation of a bird destroying a serpent. The subject however of the serpent-guarded race will be noticed in describing the next series of remains at Oodehghir.

The marked devotion paid to the sun deserves notice mainly in connection with a snake-protected people, and with the worship of the tree and of the sacred mount. An unfinished inscription in a ruinous temple at Oodehpoor is solely in praise of the sun, as will be again noticed, and it may be well to bear in mind the existence of the "Saurya" sect among Hindoos, of the "Hom" offerings, and of the import of the brahminical "Gayatri."

In considering the structure of these Topes with their one or more terraces, and with entrances which images guard or sanctify, and in reflecting on the fact of their disuse for many ages among the Jain representatives of the Buddhists, one is almost led to the conclusion that as brahminism prevailed, the *terraced mount* gradually became changed into the "Gopura" and "Vimana"—the storied entrance and *solid* pyramidal temple of the superstitions of the south of India. A Pagoda still comprizes entrances, and courts, and shrines, as well as a principal place of worship, and such was very much the plan of the ancient Buddhist edifices under consideration, while the succession of doors which lead to nothing, or abut against a solid wall, seems but an improved copy of what a Tope must have presented with a succession of stories, and with entrances admitting merely to narrow passages.

One can indeed almost trace the elongation of the terraced Tope or "Degopa" into the storied temples of the Buddhist Chinese, and into the great Minar or tower at Delhi, which is surrounded with Buddhist remains. The buildings of the Nepalese show the transition or intermediate state in the one instance, and the present Jain models of Meru or of a Tope, well represent the Qootub Minar with its succession of balconies. The traceable change of the flat Basilica of declining Rome into the lofty Cathedrals of the middle ages seems to illustrate this speculation.

The impression left on the mind after an examination of these sculptures is, that while they are eminently Indian in their characteristics, there is nevertheless something Persian or Babylonian, and also something Egyptian about them. The Persian seems the stronger of two complementary elements, and the impression at the same time is, that the people of Mesopotamia influenced those of India mainly by sea, and not by land routes and communications, or through commerce and emigration rather than by conquest, but that the snake-protected Buddhists did so by military expeditions also is more than probable.

*Oodeghir*.—To the west of the Betwah river, and a mile and a half or two miles from Bhilsa, there is a low range of hills named Oodeghir, in the soft sandstone of which many small caves or niches have been hollowed. The largest is dedicated to Shiv, and is 17 or 18 feet square, with 4 pillars, all cut out of the solid rock. This temple contains a Sanscrit inscription of little interest except that it gives a date, viz : 1093 Sumbut. There are also many figures sculptured outside the entrances, but most of these represent single divinities or heroes, and the interest of the series centres in two groups, one showing Vishnu as the Varaha avatar, or with a human body and the head of a boar, and the other showing Vishnu slumbering on the vertical folds of the serpent,

The Boar manifestation is 8 or 9 feet high, and is almost detached from the rock out of which it is carved. The god supports with his tusk a small female figure, which seems to cling to this natural weapon of the divinity. In front of Vishnu, there is a larger sized female figure, kneeling, and with uplifted hands imploring him as if to spare, perhaps the virgin in his power. This figure has the expanded hood of a snake over her head. Behind her there is another figure, also kneeling, but much mutilated. On the solid wall of live rock there are

sculptured above, before, and behind Vishnu, numerous small figures in successive rows and as if forming processions. Nearly all of these have the short tunic and cap noticed among a few of the figures of the Tope gateways. Some of the people represented are playing on musical instruments, and hence the country people call the monuments by the name of "*Mama Banjeeka Burdt*," or "the uncle and nieces marriage procession."

The figure of Vishnu reclining on the serpent is about six feet long and is likewise in bold relief. The head of the reptile with its many-eyed hood, curves over the head of the God as if to protect or shadow it. The several Hindoo Divinities are represented by their symbols, of a bird, &c. as spectators of Vishnu's greatness.

The inscription sent is apparently incomplete; it is to be seen upon the rock near the Boar-god.

These sculptures seem typical of the triumph of Vishnu over the Serpent, of Brahminism over Buddhism, and it is to be regretted the date cannot be ascertained, for the 1,093 Vicramaditya already quoted may have been inscribed by some pilgrim.

Of the Jain hill three miles N. W. of Oodehghir, and of the unfinished figure of a horse south-east from the Satcheh Tope, which are mentioned by Dr. Yeld or Captain Fell, [Journal As. Soc. III. 489] I did not learn, but as I knew not that such had been noticed, I could only inquire generally for monuments and remains.

*Ghearispoor or Gheiaspoor.*—Ghearispoor, or Gheiaspoor, is on the road between Bhilsa and Saugor, two marches east of the former place. The Hindoos connect the name with the importance they attach to the 11th day of their half months, and the Mahometans regard one Gheias as its founder. It is certainly a place of some antiquity, and among its remains the Buddhist temple deserves notice. The site of the temple is nearly at the top of a sandstone hill, and it is built on a platform gained from the hill by making the step side a complete precipice. A small square "adytum" with pillars before it supporting a dome, is inclosed in a rectangular building about 50 feet long by 30 feet wide, which has one entrance with a portico in front of, or outside, the four pillared dome. The external walls are not finished, for the live rock prevents the completion of half a side and a portion of the back or end. The "adytum" is surmounted by a pyramid or spire, resting partly on



the external walls, and as in front of it there is the dome, the temple resembles the ordinary Indian type, except that it is more rectangular and less "crucial" in plan, and that it has one entrance only instead of the three common to many other temples of the same dimensions.

There are several images of Buddha in this temple, and among the sculptures may be noticed a figure resting on a cornucopia, and a "Merman," or a human head and shoulders, &c. with a fishy extremity. The merman's head is shaded by a serpent's hood. Birds eating clustering fruits are also carved with some spirit.

There are no inscriptions on this building except such as pilgrims or visitors may have cut; one of these is dated 1551 Sumbut (1494 A. D.) one period of the re-assertion of Hindoo independence, but the temple serves to show the Buddhist love for hilly spots; and this ornate edifice is situated much as the comparatively rude "Tope" in the Khyber Pass has been placed, or like that of Belur and others near Rawul Pindee.

*Oodehpoor.*—The decayed town of Oodehpoor is situated to the eastward of the Betwah river, and to the eastward likewise of the road leading from Bhilsa to Seronj. It stands at the foot of an isolated standstone hill, and is said to take its name from Oodehajeet, a lineal descendant of Vicramaditya and of Bhoj, who acquired a great name in Malwa about the middle of the 11th century of our era, and whose rights are declared to be still inherent in a Powar Thakoor, the Zemindar of the Pergunnch.

The temple of Mahadeo at Oodehpoor, is still a work of great beauty, although it has been much injured by the Mahometans. Its ground, plan forms a Greek, or nearly equal-armed cross, with the outline every where broken by regular projections, and with the corners filled in, much as we are told Sir Christopher Wren wished to do when he built Saint Paul's. It is about 70 feet long by about 60 wide; the walls are thick,—three arms of the cross contain entrances with external porticos, while the fourth, opposite the main entrance, forms the "adytum" or recess in which is placed the Lingam or mark of Siva. The interior forms an irregular or broken rectangle, which again includes right pillars forming an unequal-sided Octagon. Over the Adytum or Lingam rises the usual storied or clustered pyramid, while a dome with side vaults rests upon the other three arms of the cross and upon the eight



pillars. The temple is built of red sandstone without lime, or at least without any readily perceivable in the joints, for the blocks are very nicely fitted. Every stone is an ornament in itself, a human or animal figure, or a flower, or a portion of a fillet or ovolo,—but the individual beauty has at the same time been rendered subordinate to the general effect.

The Lingam with its shapely pedestal is about eight feet high, but the plain cylinder has been capped with a brazen head, to make the presence of the god more clear to the apprehensions of the rude and the superstitious. Under the dome and facing the Lingam, is placed the cumbrous recumbent Bull dedicated to the divinity.

On a stone of the passage of the main entrance there is a long Sanskrit inscription, but the door opens back upon it, and as the passage is not well lighted otherwise, the partial closing of the entrance makes it so dark as to render the writing difficult to decipher. Many of the letters have also been imperfectly cut or are now defaced, and the transcript which is sent may not accurately represent the original. It is such however as three or four men tolerably well versed in Sanscrit were able to make of it, and it cannot be far wrong in any essential point.\*

As it has been read to me, the inscription states that Biboodh, Gokul Deo, and Gheata (or Soojan, who built many temples to Shio) were succeeded in the dominion of Malwa by Oodehajeet, who died in 1116 Sumbut (1059). After Oodehajeet the power of the Yuvvuns or Mahometans prevailed for 446 years, at the end of which time Chanddeo became powerful and was termed the Lord of Magadha, and whose son, Lohugraee, collected stones for a temple in 1562 Sumbut, (1505 A. D.) The inscription concludes with the remark that what had been understood had been written, and it is hence probable that it is not a contemporary record, but the work of some pilgrim, and that the temple may in reality have been built by Oodehajeet about the middle of the 11th century of our era. The rise of Chanddeo is synchronous with the dominion of Singram Singh of Chittor, the Rana Sanka of Baber, and is another corroboration of the declension of the Mahometan power which took place under the Khizzers and Lodis of Delhi.

The Toghluks in their career of conquest, visited and defaced this elaborate temple of idols, and built within its precincts a simple mosque to the God of Mahomet. The mosque is still standing, and

\* This inscription has been given with translation, in Vol. IX. p. 545.—EDS.

its gates or entrances, now represented by two solitary jambs with broad lintels, are within a dozen yards of the back of the temple itself. There are Arabic inscriptions over these gates, to the effect that the mosque was built in the year of the Hijree 739 (1338-39 A. D.) and in the reign of Abool Moojahid Mahomed Ibn Toghluk Shah. Another mosque, one of some pretensions, was afterwards erected in the vicinity of the temple. It was finished in 1041 Hijree (1631-32), as the inscription says, "at Oodehpoor on the borders of Gondwana."

The temple at Oodehpoor is perhaps as elegant a specimen of old Hindoo architecture as is now to be found to the north of the Nerbudda, always excepting the Qootub Minar at Delhi. It yields indeed in size to the temple built at Bindrabun by Man Singh of Jeypoor, which was defaced by Aurungzeb, but it surpasses it in the proportions of its design and in the elaborateness of its details. It is a monument moreover of the varying fortunes of brahminism. It was most likely erected when the "twice-born" had fairly triumphed over the Buddhists. Within three hundred years it was despoiled by the Mahometans. In two hundred years more the victories of Rana Sanka allowed votaries once again to flock to it, but the rise of the Moghuls soon consigned it a second time to the neglect of the rich. The Moghuls fell, and a dynasty of brahmins from the south mastered the country, and showed at once their gratitude and the grossness of their apprehensions, by capping the simple black stone of Muhadeo with an idolatrous brazen head. This last bequest to the temple is dated in 1841 sumbut (1784 A. D.), and in two generations from that time the new masters from the west, while admiring the beauties of the fabric can trace the corruption which beset brahminism in the hour of its success. Fetichism had been sublimed into a symbolic yet philosophic Deism, but in the eleventh century priestcraft fully appreciated the advantage of mystery, the blackstone is no longer conspicuous in the open air or in the centre of a lofty edifice, it is concealed in an "adytum," a "holy of holies," and the trembling devotee reaches it through a gloomy passage, and can at last only see it by the partial and flickering light of an oil-fed taper.

Oodehpoor has its fane attributed to Jains or Buddhists, as well as its temples, certainly Brahmin and Moslem. The Beeja [or Vijaya] mundur is two-storied and about 40 feet long by 20 or 22 feet wide,

exclusive of an entrance porch. It is of somewhat rude or plain workmanship. Its ground plan shows three chambers with a cloister or veranda before them. The upper story has been converted into a dwelling house, the lower is untenanted, but I could not, amidst the rubbish which encumbers it, see any image. On either side of the entrance, tablets have been inserted in the wall for inscriptions, but one inscription only has been begun and two-thirds of what was designed is still unwritten. The language is Sanscrit, but the letters, which are beautifully cut, are Pracrit or Mugadha, or such as are still read by the Jain priests. The subject is the sun and the glories of that great luminary, but no date or name helps to fix the era of its erection or the faith of its builders, and it is perhaps tradition, rather than certain knowledge or probable criticism, which makes the several "Beeja mundurs" of this part of India to be Jain temples. In structure however this one at Oodehpoor closely resembles the low-roofed Buddhist temples or shrines still visible around the Tope at Satcheh.

*Ehrin*.—Ehrin, in the Saugor territory, is now a village on the left bank of the Beena, near its junction with the Betwah, about 25 miles N. E. from Serong—but it appears once to have been a town of some local repute—small copper coins can still be found after each successive annual denudation of the mounds which mark its site, and several adjoining monuments of stone, the remains perhaps of an extensive integral series, make the place well known for many miles around. Some of the coins accompany this letter, but nothing perhaps can be made of them.\*

The most remarkable of the monumental remains is Vishnu manifest as the Boar. The animal stands about 10 feet high with his snout in the air, and it is in length perhaps 12 feet. The body is carved all over with successive rows of small figures having the short tunic and high cap or head dress remarked at Oodehghir and Satcheh. A band, ornamented with human figures seated, encircles the neck of the animal. The tongue projects and supports a human figure erect on its tip. A young female, here, as at Oodehghir, hangs by the arm by the right tusk, while the breast is occupied with an inscription, of which a copy has been made as accurately as its mutilated state and the short-

\* Small, square and much worn copper coins, with the *bodhi* tree, the *swastika*, and other Buddhist emblems.—Eds.



ness of time would allow.\* The Boar itself is ill-shaped, but the human figures show more skill in design.

To one side of this "Owtar" stands a four-armed Divinity, 12 or 14 feet high. His habiliments are Indian, that is, his loins are girt. He has a high cap or head-dress, while round his neck and reaching to his feet there is a thick ornamental cord resembling a modern "Boa," with its ends joined. The vestibule of a small cupola which once probably covered this statue is still standing. On these entrance columns are seen figures who wear the Juneeao or thread of the noble Indian races, in addition to the ornamental cord above described. Other devices consist of twisted snakes, suspended bells—of figures of elephants, fishes, frogs—of women naked, recumbent, and giving suck to children, and of seated Buddhas. There are also many faces of Satyrs, filling bosses or compartments.

Behind a small pillared temple there still stands a figure with the face perhaps of a lion—but with a human body and with human limbs.

The above three figures form one row or series, with however, other undescribed remains between them or beyond them. In front of them there are three figures of couching lions, and in front of these again, are two columns or rather one pillar and a fragment, and a small temple half buried in the soil. The column has a broad base; for about 15 feet the shaft is square, and for about 10 feet more it is round. The bell capital, described at Satcheh, occupies perhaps two feet, a second capital, so to speak, adds three feet more to the height, and forms a pedestal for a small double fronted four armed statue. On this column there is likewise an inscription which has been copied as well as time and decay would allow.

Among the many figures carved on fallen pillars, the use of the Juneeao may be observed, and the whole of the remains are attributed to one Raja Behrat.

At Putaree, in the same quarter of the country, I heard of a stone representation of an animal of some kind, or of a stone which was in someway remarkable, but I had not an opportunity of visiting it.

The monuments at Ehrin are perhaps antecedent to those at Oodeh-

\* This inscription has been published with a translation, in Vol. VII. p. 632 of the *Journal*.—EDS.



ghir, and although they mark the prevalence of *Brahminism*, they look like adaptations from *Buddhism*.

*Soondursee*.—There are other remains of value or interest in this vicinity, which I may hereafter have an opportunity of visiting, and the three inscriptions noted below may deserve to be recorded. The first is on a small temple to Shiv at Soondursee (or Sindersee) on the Kalee Sindh river, about 25 miles to the south of Sarungpoor. It gives a date 1220 Sumbut, and states that the temple was built by Baba Bulwunt Dukhune. The temples at Soondursee are rude, and the usual marked spire is replaced by a plain pyramid of an attitude not exceeding the side of its base. This rudeness may be provincial only, for although art doubtlessly declined in upper India about that period, a temple to Mahadev at Nimawar on the northern bank of the Nerbudda, about 50 miles below Hosungabad, and which gives a date 1253 Sumbut, shows some taste and skill. It is however much inferior in both points to the temple at Oodehpoor.

*Shore*.—At Shohore, 20 miles west of Bhopal, a traditional “Beejamundur” now forms a somewhat rude mosque, giving a date of 732 Hijree (1331-32) which like the Musjid at Oodehpoor, marks the period of Toghluk’s sway.

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POSTSCRIPT.—I have referred to the “Maru” of the Jeins as illustrating the belief of the old Buddhists, and as expressing an idea common to all the ancient Indians, and not merely peculiar to the brahmins and borrowed from them by a recent sect. The Jewel-footed Parishnath of the Jeins, may also perhaps throw some light on the well known formula of the modern Buddhists of Tibet, which has been variously interpreted by European scholars,—Mr. Hodgson’s little volume on the literature and religion of the Buddhists, p. 171, &c. may be referred to, and it will be seen that M. Klaproth gives two translations, while M. Csomadekörös, Sir Wm. Macnaghten, and Mr. Hodgson himself give each one. All of these versions turn upon “Padm” as meaning Lotus, and M. Csomadekörös, states that such is the interpretation put upon it by the Lamas themselves. Padm however means foot as well as Lotus, and the Jeins still worship “*Mani Padom*,” or him of the Jewel-foot, while the idea of feet so enriched or adorned is common to the whole Indian world as implying Divinity, although perhaps, like the silver-footed

Thetis of the Greeks, the image may have been poetical only in the first instance. The accompanying transcripts satisfy the Sanscrit scholars of this quarter, and they seem accurately to represent the two originals, the "Ranja" and Tibetan copies respectively. It will be observed that the Tibetan makes the Godhead or the Divine essence or emanation to be feminine, if the rendering now given is admitted to be correct.

The last word of the formula may apparently be regarded as a "Beej" (vija) mystic root or germ equally with the first, and the meaning will thus become "The Lord, the Jewel-footed, the preserver." This translation does not affect the characteristic of Mr. Hodgson's "Padma Páni" or present Lotus-handed Regent "Dhyani Bodhisatwa," but it interferes with the functions of the "Oon," gone bye, he of the *Jewel-bearing* hand, *Jewel-footed* seems to be the more ancient notion of the two, and it will be curious should the Nepalese Buddhists appear to have founded a distinction between themselves and other worshippers of representatives, by removing the essence or symbol of Divinity from one limb to another.

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On the Tibetan Badger, Taxidia Leucurus, N. S., with Plates. By
B. H. HODGSON, Esq.

Carnivora.

Subplantigrada.

Arcto galida. H. Smith. Genus meles.

Subgenus Taxidia.

Species new. T. Leucurus, Mihi.

Túmphá of the Tibetans.

Habitat. The plains of Tibet.

There is not yet, I believe, any record of the Badger as an inhabitant of the east. The occurrence, however, in the sub-Himalayas of the allied forms of *Helictis*, *Urva* and *Ursitaxus*, has led me for some time past to expect such a discovery in the Himalaya or Tibet, and my anticipations have just been fulfilled by the receipt of a very fine specimen of the Badger from the neighbourhood of Lassa. The spoils obtained by me are those of a female of mature or advanced age, as is proved by the obliteration of the cranial sutures and by the flaccid enlargement of the teats. The animal was killed in the preceding autumn when in full fur, and, as the skin is well prepared without distortion, and as it

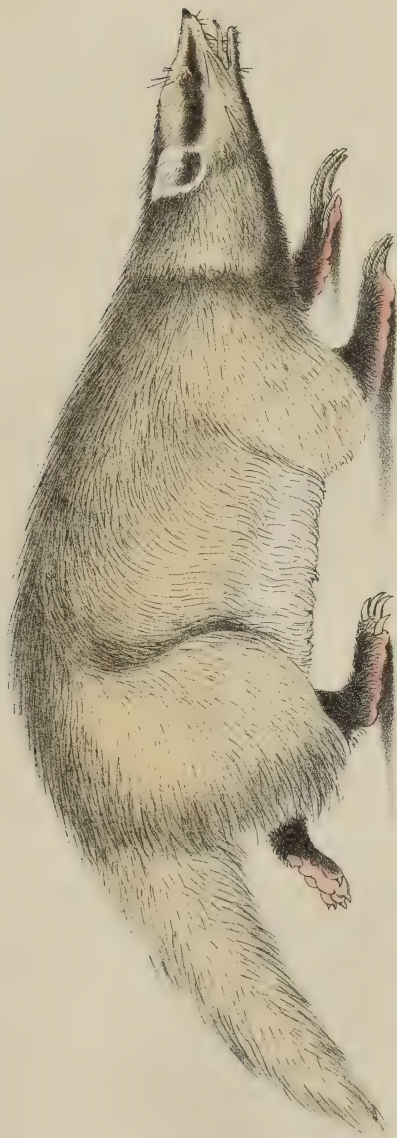
is provided with perfect head and limbs, these spoils afford excellent materials for description, exclusive of the soft viscera and their long case, which are wanting.

The Badger of Tibet, called Túmphá by the inhabitants, falls under the North American instead of the European section of the Genus. In other words, it is a *Taxidia* not a *Meles*, of systematists, having only four molar teeth on each side of either jaw, whereas the European type has five molars above and six below, on either side.

The Tibetan Túmphá is a smaller animal than the Badger of Europe or than the Carkajou of America. It is contra-distinguished from both these animals by a considerably longer tail, and also by a locomotive structure not plantigrade, but only subplantigrade, or, in plainer terms, by having a third of the sole of the hind feet thickly covered with hair instead of the whole being nude to the heel. From the Carkajou of America the Túmphá of Tibet differs by the very inferior size of the claws of the posterior extremities,* a point in which the Túmphá agrees with the European Badger, as it also does so remarkably in colours that there is some difficulty, without having both animals before one, in noting their difference in this respect. On the other hand, the disagreement of the Túmphá with the American Badger in point of colour is as striking as is its craniological conformity with that animal and deviation from the Badger of Europe. The last named animal is from $2\frac{1}{2}$ to $2\frac{3}{4}$ feet long from snout to vent, and the tail, inclusive of the hair, is from 6 to 7 inches more. The head to the nape, is $6\frac{1}{2}$ to 7 inches, and the mid fore claw $1\frac{1}{4}$ inches. I have no equally accurate details to refer to for the Carkajou, but it is, I believe, about the size of the European Badger, or somewhat less; and H. Smith says it has a shorter head but stands rather higher on the legs. These references to the Badgers of Europe and America, will I hope, enable the reader better to appreciate the following description of the Badger of Asia, now first noticed as a tenant of this quarter of the globe.

The Túmphá or Tibetan Badger is in total length 37 inches, whereof the tail, with the hair, is 10 inches, and without it, 7. The head is $5\frac{1}{2}$ inches, the palm and nails $3\frac{1}{8}$, the planta or rest of the hind foot,

* H. Smith, describing the Carkajou from life, expressly says that "all the extremities are armed with long powerful claws," or I should have supposed the forefeet only are so armed, as in the Badger and Túmphá. See Note, Lib. XI, 211.



TAXIDEA leucurus (Hodgson)

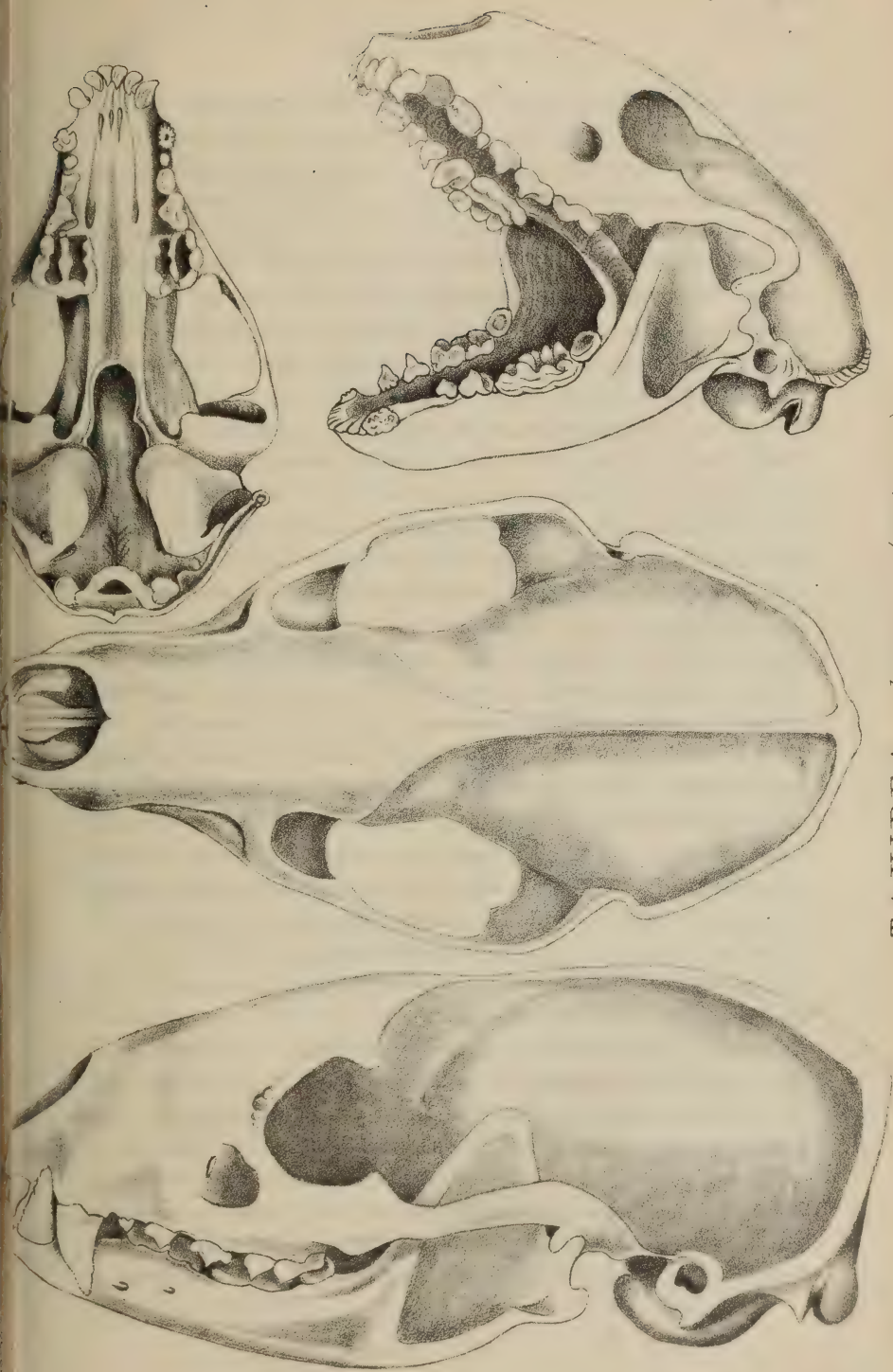
T. Black, Asiatic Linn. Soc. Cal.

from heel to end of the nails, 4, the longest claw or nail, $1\frac{1}{4}$, the ear $1\frac{1}{4}$, the longest hair of the body, $4\frac{1}{4}$. The aspect is entirely that of a long-tailed Badger, with somewhat smaller head and longer finer fur than usual. The small head is conico-depressed with remote ears and eyes, and sharp elongated face. The muzzle or nude extremity of the nose is clearly defined, rounded, prolonged beyond the teeth, and has an abrupt oblique termination in front. The oval nostrils are opened entirely to the front, their lateral prolongation being merely linear and very much curved. The lips are thin and almost void of moustaches; and there is a still fainter indication of the tufts proper to the cheeks, chin, and eyebrows. The small pig-like eyes are situated midway between the ears and tip of the snout. The ears are oval, well developed and tending to a point. The helix is unfissured and the interior of the ears void of membranous processes, but hid with hair which amply covers these organs inside and out and ends in a full diffused, yet somewhat pointed tuft. The neck and body are rather elongated yet full, and appear even heavy from the copiousness, length and free set of the double pelage. The limbs are low, stout and suited only to slow action on the ground, with the heel very slightly raised, but admirably fitted for digging; pentadactylous before and behind: the hands larger and stonger than the feet, and furnished with huge fossorial claws more than doubly larger than those of the hind extremities. The palm is entirely nude to the wrist, save only a small central tuft of wool-like hair, and the inferior surface of the digits is likewise quite nude. The palm is not a full soft mass nearly enveloping the digits and hardly distinguishable into balls or pads, as in the Bears and Bear-badgers (*Ursitax*), but is hard, spare of flesh, and distinctly divided into pads which take in only the bases of the four fingers; form a crescented series of irregular shape and diminishing in size from the outside to the inside of the foot. The 5th digit or thumb has no basal pad, it being short and small. The corpal pad is void, large and placed on the exterior side of the palm at its base. The fingers, of medial length and stout, are united as far forward as the postea edge of the terminal pads by a strong membrane not susceptible of much expansion. Their pads form a curvate regular series to the front, like the basal tier abovenoticed, the two central fingers being nearly equal and the two laterals also, interse. The small feeble thumb

is so much withdrawn from the front that the anteal edge of its terminal pad barely touches the postal edge of the same pad in the index. The termino-digital balls or pads are very large, suited to keep the great claws from the ground and thus to enable the animal to walk without that inversion of the claws, to which the Ant-eater and Pangolin are reduced. Of the planta or sole of the hind feet one-third, reckoning from the heel to the end of the toes, is thickly covered with woolly hair: the rest is nude. There is no metatarsal pad to answer to the metacarpal one; but otherwise what has been said of the palm will suffice to explain the structure of the planta, inclusive of its digits. The claws of the four feet are typically fossorial, diggers in perfection, being large strong, moderately curved, compressed, with round backs and sharp edges below, except near the points where they are widened and scooped. The claws of the hind feet, as already noted, are very much smaller, and more nearly equal in size in all the 5 digits.

The tail with the hair exceeds $\frac{1}{3}$ of the length of the animal, and is equal to a $\frac{1}{4}$ without the hair. Like the body it is pretty uniformly dressed in long hair extending much beyond the true tail, which is gradually attenuated from a thickish base. The pelage, or fur, is of two sorts, hair and wool, both rather fine, both ample, and both of free set, that is, laxly applied to the skin. The head is dressed in short close hair only. The hair of the limbs is rather looser and longer, and has a very little wool at its base: it is harsh and thick but not elongated as on the body. On the belly the hair is about as long as on the limbs, but scantier much in quantity, and rather woolly. On the body hair is above 4 inches long, and the wool above 2 inches. On the tail there is no wool, and the hair is an inch shorter than it is on the back. The hair is fine, elastic, strong, straight, and somewhat flattened towards the points, but not undulated. The wool is wavy, as usual, and about half the length of the hair. The anal pouch is very noticeably large and has pretty evidently the form of that organ peculiar to the badger,* though its particulars cannot be safely described from any but a fresh subject. The teats are six, remote and ventral, or 2 inguinal and 4 ventral. The papillæ of the tongue are pointed and even corneous, but minute enough to make it feel smooth. The skull is 5 inches long, 2 high and $2\frac{3}{4}$ wide between the zygomæ. It is very

* English Règne Animal, II. 271 et 30.



TAXIDEA leucurus (Hodgson).

massive and weighty, and describes a gentle uniform curve from end to end of the culmen : facial portion very small : frontal and cerebral very ample : orbits incomplete postally : a single very large foramen before them : parietes tumid : longitudinal and transverse cristæ moderate : lower jaw very strong, and so completely locked in the cylindric hinge manner, as to be with difficulty separated. Many of these are general characters of the skull in the Badgers proper (*Meles*), and are also found, for the most part, in *Ursitaxus*, *Urva* and *Melictis*. But the teeth are more strictly characteristic. They are in number $\frac{6}{6} \cdot \frac{1}{1} \cdot \frac{1}{1} \cdot \frac{4}{4} \cdot \frac{4}{4} = 32$, as in the *Ursitax* ; but, whereas in the Bearbadgers the upper tubercular tooth is disposed transversely and is inferior in size to the carnassier, in the more strictly Melean form of *Taxidia*, the tubercular is ranged in line with the other molars, and is so large as to equal in size not merely the carnassier, but it and the two false molars before it. The first molar of the Tibetan badger is small with a single acutely conic process ; the next is larger but of the same form. These two are false molars. The third is the carnassier. It is of trigonal shape, and as much larger than the greater false molar as it is less than the tubercular. Its exterior side is trechant, obtusely conoid (in profile) and compressed : the other two sides include a flattened oblique grinding surface or internal heel. The fourth and last tooth of the upper jaw is the great tubercular. It is of a squarish shape, but longer than broad, and has its crown marked by 3 longitudinal ridges with two furrows between them. Of these ridges the exterior one only is slightly trenchant and has a saddle-like dip in its centre. The two other ridges are nearly or quite rounded. The posterior margin has an oblique flat slope, purely tritulant, upon which the little flat tubercular of the lower jaw grinds with its whole surface. In the lower jaw the two first molars bear much the same character as those above, but are rather larger and have tiny heel-like processes before and behind the central cone. These teeth are also slightly compressed. The third or carnassial tooth is long and narrow, equal in size to all the three others of the jaw, and exhibits a central dip or groove receiving the central ridge of the tubercular of the upper jaw, while its two sides, which are brokenly ridged, fall into the two grooves of the same tooth and its anterior part, consisting of three irregular cones, acts trenchantly against the cutting part of the upper carnassier, or grinds against

its heel. The laniary teeth are void of any peculiarity, so far as can be judged, for they are injured. Of the incisors the of upper jaw the two extreme laterals are longer than the rest and pointed. The others have obliquely flattened crowns upon which the incisors of the lower jaw work in a quasi-tritulant manner. The incisors of the lower jaw are crushed between the two laniaries, there being scarcely room for them in the interval, though the two intermediates are inserted more backward than the rest, seemingly in order to find room. The Badger is alledged to be a dull animal, defective in all the organs of sense. But in the skull now before me of the Badger of Tibet, as compared with that of several allied genera, I perceive no evidence of deficiency, the cavities for the reception of the auditory visual and olfactory apparatus being sufficiently developed, and the brain-pan being unusually capacious; so that one may suspect that if the Badger were to exert his formidable means of offence with greater alacrity he would command more respect from his human critics. Whatever I have been able to gather as to the habits of the *Túmphá*, makes them accord with those of the English Badger, and is in harmony with the indications of the skull. The *Túmphá* dwells in the more secluded spots of inhabited districts, makes a comfortable, spacious and well arranged subterranean abode, dwells there in peace with his mate, who has an annual brood of 2 to 4 young, molests not his neighbour, defends himself, if compelled to it, with unconquerable resolution,* and feeds on roots, nuts, insects, and reptiles, but chiefly the former two, or vegetables not animals, a point of information confirmed by the prevalent tritulant character of the teeth. It only now remains to describe the colours of the *Túmphá*. The head above and laterally is of a yellowish white, and this colour descends so low on the sides of the head as to take in the edge of the lower jaw to its tip. This pale hue of the head is divided lengthwise by a black brown line that runs from the moustache through the eye to the ear, both inclusive; but neither the dark nor pale colour extends backward over the neck, both being lost, though without abrupt transition, behind the ears. The ears inside and out are basally black, and terminally white. The neck and body above and laterally are of a yellowish pepper and salt hue, paling as you descend the flanks. The tail is void almost wholly of the darker ingredient of the mixture, being

* The captors of mine, were obliged to knock off his eye-teeth, he bit so perseveringly.

scarcely shaded grey near the body ; and elsewhere, pure yellowish white, which colour likewise spreads round the anal and genital organs. With that trivial exception the whole of the inferior surface, from chin to vent both exclusive, as well as the entire limbs, are black, of a more or less sooty tinge. The nude skin, wherever visible, is dark brown, or black as on the belly, where the scanty pelage allows it to be partially seen. The iris is clear brown, and the nails sordid horn colour. The mystaceal and other bristles, blackish : the tongue and palate, pale.

The prevalent grey cast of the colour upon the upper parts of the animal results from the distribution of tints upon the longer or hairy piles and upon the shorter or woolly ones, which likewise are distinctly visible owing to the loose set of the former. The wool, then, wholly, and the basal two-thirds of the hair also, is yellowish white : the terminal third of the hair black, tipped more or less largely with yellowish white ; and thus is produced the pepper and salt hue above spoken of, which becomes paler on the flanks than on the back, because the dorsal hairs are more largely and generally furnished with the large black ring than are those of the sides.

Whoever may compare this description of the colour of the Tibetan Badger with those of the English animal furnished by its describers,* will at once perceive how almost absolutely identical the tints and their distribution are in the two animals. I cannot confidently point out a single disparity except that the tail is more entirely white in the *Túmphá* : and this is a very interesting circumstance as evidencing the intimate affinity of the two sections of the Genus, or *Meles* and *Taxidia*. From the English Badger or type of restricted *Meles*, however, our animal may be at once discriminated without referring to skulls, by its inferior size, greater length of tail, and partially clad planta or foot-sole. Of the American Badger or *Taxidia*, two are spoken of, viz. the *Carkajou* and the *Tlacoyotl* : but of these the former alone, I believe, yet finds a place in scientific works, and it is distinguished from its Asiatic analogue, the *Túmphá*, by the following external marks, none of which belong to our animal : belly and throat white : dark vertical bar down the cheek : two more longitudinal ones running from the muzzle to the mid-back, where they meet, enclosing all the way a white space : tip of the tail black.

* See Note, *Libr.* VII. 148, and *English Règne Animal* II. 271.

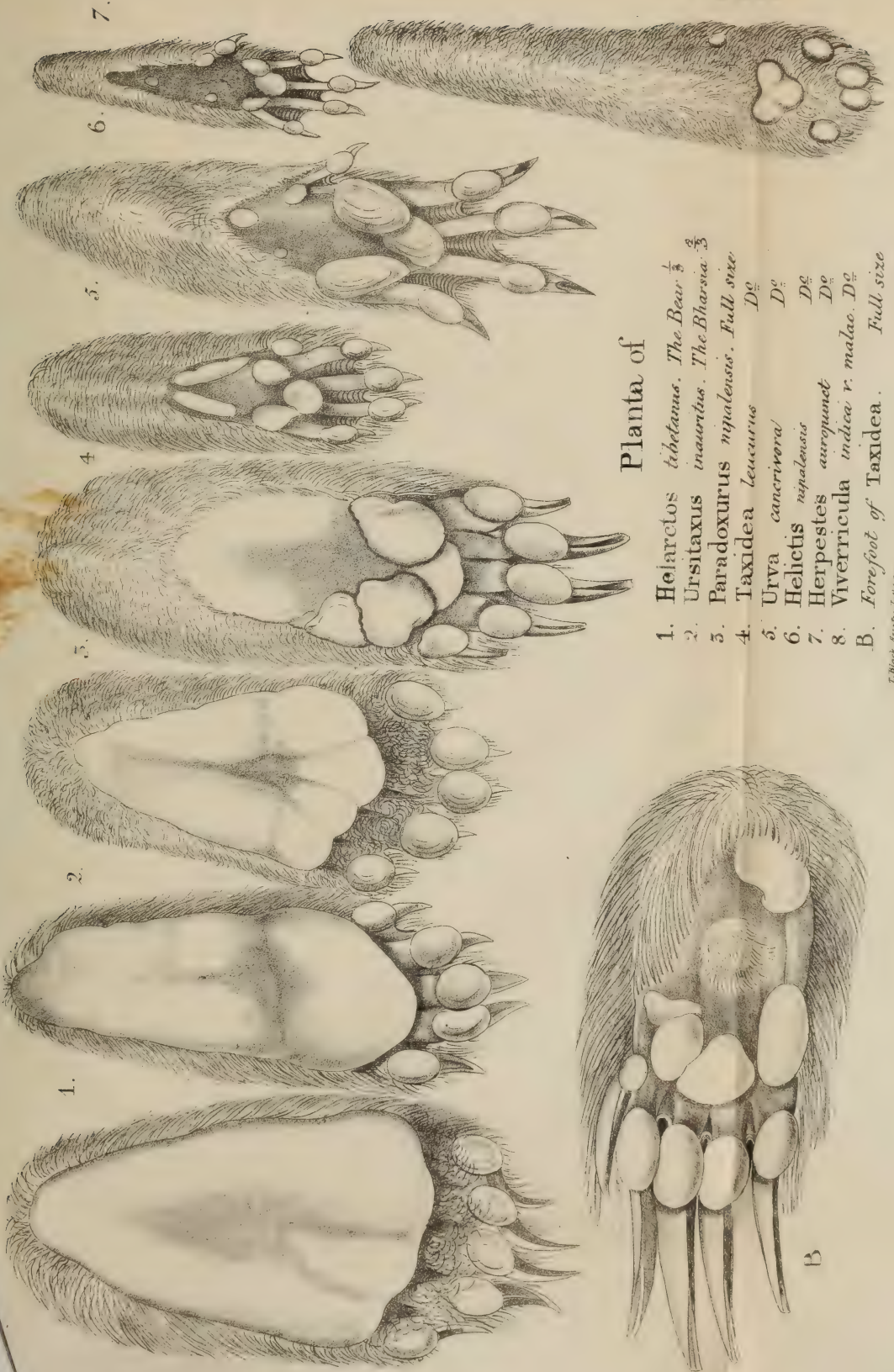
Such being the marks of the only other known species of *Taxidia*, there can be no doubt our species is new; and I fancy that Zoologists will hail with surprise and pleasure the discovery of an emphatically occidental type in the remote east. Very beautiful illustrations of our animal, from the pencil of my Newar artist, accompany this paper; and, as the *Túmphá* belongs to a group of animals dubiously suspended, as it were, between the *Digiti* grades and *Planti* grades, occasioning infinite debate, I add to the other illustrations of my paper a comparative series of views of the feet of such of these forms as belong to *Himálayan* Zoology, and are mostly recent discoveries. These are *Ursitaxus*, *Helictis*, *Urva*, *Herpestes* and *Paradoxurus* and *Ailurus*; to which I add of course *Taxidia*,* and *Helarectos* and *Viverricula*, as illustrative extremes, merely of the other and medial forms.

Dimensions of the Tibetan Badger.

(FEMALE.)

Total length from snout to end of tail tuft,	3	1	0
Snout to vent,	2	3	0
Head to occiput, straight,	0	5	$\frac{1}{2}$
Snout to foreangle of eye,	0	2	$\frac{1}{8}$
Thence to base of ear,	0	2	$\frac{1}{8}$
Tail and hair,	0	10	0
Tail only,	0	7	0
Girth behind shoulder,	1	6	0
Palma and nails, longest,	0	3	$\frac{1}{8}$
Planta and nails, from os calcis,	0	4	0
Planta only, or nude rest of foot,	0	2	$\frac{1}{2}$
Longest forenail,	0	1	$\frac{1}{8}$
Length of hair on body,	0	4	$\frac{1}{4}$
Length of wool,	0	2	0
Length of ear, less tuft,	0	1	$\frac{1}{4}$
Length of ear and tuft,	0	2	0

* I have not met with *Mydaus* or *Arctonyx* or *Arctictis* in these regions, and I fancy that Duvancel's authority for the last in *Bhútán* Vel *Deva Dharma*, is erroneously quoted like mine. The alleged identity of *Ursitaxus* and *Mellivora* is yet open to doubt: nor is it by any means certain that the species tenanted the plains of Hindosthan, the *Biju* is the same as the highland animal or *Bhársia*. Some of the above details of *Taxidia* will, I fear, prove tedious reading. But the type is rare and he who has it not before him can judge its characters, especially those of the skull, solely by means of such minute description.



Planta of

1. *Helarctos tibetanus*. The Bear $\frac{1}{2}$ $\frac{2}{3}$
 2. *Ursitaxus inauritus*. The Bharsia $\frac{1}{2}$ $\frac{2}{3}$
 3. *Paradoxurus nipalensis*. Full size
 4. *Taxidea leucurus* $D_{\frac{1}{2}}$
 5. *Urva cancrivora* $D_{\frac{1}{2}}$
 6. *Helictis nipalensis* $D_{\frac{1}{2}}$
 7. *Herpestes auroreus* $D_{\frac{1}{2}}$
 8. *Viverricula indica* v. *malac.* $D_{\frac{1}{2}}$
- B. Forefoot of *Taxidea*. Full size





HYSTRIX alophus (Hodgson)

J. Black, Asiatic Lib. Prop. Cal.

SCULL.

Length of intermax to occipital crest,	0	5	0
Width of, between zygomæ,	0	2	$\frac{1}{6}$
Width, greatest, between parietes,	0	2	0
Heigth, greatest,	0	2	0
Length of upper jaw, to end of teeth,	0	2	0
Lower jaw ditto ditto	0	2	0
Greatest width between upper molars,	0	1	$\frac{1}{2}$
The same, lower molars,	0	1	$\frac{3}{16}$

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*On a new Species of Porcupine.—By the same.*

## GLIRES VEL RODENTIA.

## HYSTRICIDÆ.

## HYSTRICINÆ.

Genus *Hystrix*.

Species new, *H. alophus* (*alpha* primitiva et *lophos* a crest.)

Crestless Porcupine.

Anchótia Sáhi vulgo.

Habitat Sub-Himálayas.

It has often been surmised that there are two species of Porcupine in India, but I am not aware that any one has yet discriminated the second and rare species from the common one, or *Leucurus*. My hunters have just brought me a fine old male of the second species above adverted to, and I propose now to give a description of it, for it is very evidently distinguishable from the common species both of Europe (*cristata*) and of India (*Leucurus*) by its inferior size, by the total absence of crest on its head or neck or shoulders, by its longer tail,\* by the white collar of the neck being evanescent, and lastly, by the inferior size and smaller quantity of the spines or quills.

The crestless Porcupine of the sub-Himálayas measures 22 to 24 inches from snout to vent, and stands about 8 inches high. Its weight

\* European species 3 feet long and tail but 4 inches.—Cuv. III. p. 205): *Leucurus* still larger? Its tail all white and its crest reaching to base of tail.—(*Zool. Jour. July*, 1831, p. 103.

is from 16 to 20 lbs. Girth behind the shoulders 18 inches. Head to the occiput  $5\frac{1}{2}$  inches. Tail only 4 inches. Tail and hollow quills,  $5\frac{1}{2}$ . Ear to the fore base  $1\frac{1}{4}$ , to crown, 1. Elbow to wrist  $3\frac{5}{8}$ . Palma and nails  $2\frac{5}{8}$ . True knee to os calcis  $3\frac{3}{4}$ . Planta and nails  $3\frac{3}{4}$ . The structure is typical, or precisely similar in all its details to that of *Leucurus*, which species however is much larger, being 28 to 30 inches\* long from snout to vent and 20 to 22 inches in girth behind the shoulder, and weighing 30 lbs and upwards. The long bluff nose, small pig eyes, andromorphous ears, short purely plantigrade limbs, (furnished with 4 toes and a rudiment anteally, and 5 perfect toes postally) and thick heavy body, give to the crestless porcupine all the ungainliness of aspect proper to his congeners, while the absence of the fine sweeping crest with which they are adorned, adds to the uncomely physiognomy another peculiar feature of dulness in this species. The head, neck, fore half of the body, and entire belly and limbs, are covered with spinous bristles which have a pretty uniform length of from 2 to 3 inches, but are shortest and feeblest on the head and limbs. The hinder part of the body, or croup and tail, only, are armed with true quills of which the longest thick ones are about 7 inches, and the longest thin ones, about 12 inches. The tail is conico-depressed, thick and but one-sixth of the animal's length. Its longest thick quills are 3 to 4 inches; and its longest thin ones, 5 to 6 inches. The rattle at the end of the tail consists of 35 to 40 hollow cylinders of about an inch in length, some of which are closed and some open at the distant end. The skin of the body is pure white. The iris brown. The nudish lips and nude soles of feet, fleshy brown. The spinous bristles black, save on the head, where they are less deep-hued, passing to brown. The white collar is very narrow and vague. The quills white with *but one* subcentral black ring; those of the inferior surface (only) of the tail, being all white, and the like marginally round the anal and genital organs: the nails brown horn. Every part of the body is covered with the appropriate vestment save the mere anal and genital

\* "If Col. Sykes be right as to the size of *Leucurus*, the common sub-Himálayan species, called *nepalensis* by me is certainly distinct and nearer to *eristatus*. It has the upper surface of the tail black laterally and white centrally, forming three conspicuous lines of colour on the upper surface. The tubes are all white and so is all the under surface."

organs, which are nude. The anus is large and tumid, being almost entirely surrounded, just within the sphincter, by two rope-like glands, whose extremities nearly meet on the mesial line above and below. The secretion of these glands is puss-like but void of odour good or bad, and is carried off by several palpable pores placed in close apposition with the glands and of which 4 larger and 6 smaller ones may be plainly traced round the margin of the anus. The penis is sheathed as in the dogs, but is directed backwards, pointing ordinarily to the anus, and is furnished with a cylindric bone  $1\frac{1}{4}$  inch long. The testes are internal. The teats are 8 and are costal, or placed upon the ribs or flanks. The very large incisors are nut-brown. The molars, which are 4 on each side, above and below, have perfectly flat crowns, hardly raised above the level of the gums, and whose surface is transversely marked by a triple fold of enamel, like three or four bits of thread with the ends brought together and the sides approximated curvewise, pretty much as in the Beaver, according to Cuvier's\* delineation. The intestines are  $30\frac{1}{2}$  feet long. The Cæcum, about 11 to 12 inches long and  $2\frac{3}{4}$  wide, is placed 6 feet from the anal end of the gut, and is saccid and banded, as well as 27 inches of the intestinal canal below it. This cœciform part of the gut has the same width as the cœcum itself. The small gut has an average width of  $\frac{3}{4}$  inch, and the great gut of  $1\frac{1}{2}$  or double.

The hemispherical stomach has the upper orifice opening centrally, and the lower, terminally, and with a well defined neck. The greater arch of the stomach is 18 inches, the lesser (between the orifices) 1 to 2 inches, exclusive of the neck just spoken of. The stomach is membranous.—Porcupines are very numerous and very mischievous in the sub-Himálayas where they depredate greatly among the potatoe and other tuberos or edible rooted crops. They are most numerous in the central region, but are common to all three regions. They breed in spring and usually produce two young about the time the crops begin to ripen. They are monogamous, the pair dwelling together in burrows of their own formation. Their flesh is delicious, like pork, but much more delicate-flavoured, and they are easily tamed so as to breed in confinement. All tribes and classes, even high caste Hindoos eat them,

\* *Regnè Animal*, Vol. III. p. 96.



and it is deemed lucky to keep one or two alive in stables, where they are encouraged to breed. Royal stables are seldom without at least one of them. The Parbattiahs call them Dumsi; the crested one, chotia Dumsi; the uncrested, anchotia\* Dumsi. The Lepchas and Limbus of Sikim do not distinguish the two species, but call both Sathung and O'—é, in their respective languages. The subject of the above description is the uncrested species, and I have only to add that its manners, like its structure, are closely assimilated to those of the white tail or *Leucurus*; but that it is much rarer than the latter.

The following are the dimensions of a fine old male of our present animal, which I have denominated *Alophus* to mark the absence of that conspicuous crest which distinguishes the common species both of this country and of Europe.

|                               |    |               |               |
|-------------------------------|----|---------------|---------------|
| Snout to vent, .....          | 1  | 11            | $\frac{1}{2}$ |
| True tail, .....              | 0  | 4             | 0             |
| Tail and tubes, .....         | 0  | 5             | $\frac{1}{2}$ |
| Tail and long quills, .....   | 0  | 8             | $\frac{1}{2}$ |
| Head to occiput, .....        | 0  | 5             | $\frac{1}{2}$ |
| Snout to eye, .....           | 0  | 2             | $\frac{3}{4}$ |
| Eye to ear, .....             | 0  | 1             | $\frac{7}{8}$ |
| Ear from lobe, .....          | 0  | 1             | $\frac{1}{4}$ |
| Ear from crown, .....         | 0  | 1             | 0             |
| Mean height, .....            | 0  | 8             | 0             |
| Girth of chest, .....         | 1  | 6             | 0             |
| Elbow to wrist, .....         | 0  | 3             | $\frac{5}{8}$ |
| Palma and nails, .....        | 0  | 2             | $\frac{5}{8}$ |
| True knee to os calcis, ..... | 0  | 3             | $\frac{3}{4}$ |
| Planta and nails, .....       | 0  | 3             | $\frac{3}{8}$ |
| Longest quill, .....          | 1  | 0             | 0             |
| Weight, .....                 | 16 | $\frac{1}{2}$ | lbs.          |

\* Anchotia exactly—*Alophus*, and Chotia—*Cristatus*.

*Rough Notes on the Ornithology of Candahar and its neighbourhood.*

By Capt. THOS. HUTTON.

[With some Additional Information on the Birds of Afghanistan.—

By E. BLYTH, Curator of the Asiatic Society, &amp;c. &amp;c.]

1. *Falco* [*peregrinus*, L. Young male].\*
2. *F.* [*subbuteo*, Lin.] These birds are found around Candahar, but did not seem to be common.
3. *F. æsalon*, Lin. The Merlin occurs also at Candahar.
4. *F. tinnunculus*, (L.) The Kestrel. (The “yellow iris” was so recorded on the wrapper of the male specimen when it came from Afghanistan, but whether upon my own authority, or that of some friend, I do not remember).
5. *Circus cyaneus*, (L.) The Common Harrier. This is rather a common species at Candahar, and frequents the marshy tracts below the city to the south, where, during the winter, Snipe and water-fowl are abundant. I saw them also at Girishk.
6. *C. æruginosus*, (L.) Also common at Candahar, especially near a small swamp to the south of the city, and along the banks of canals in the cultivated tracts;—one or more might usually be seen sitting on a stone or clod of earth, watching and peering round them, and taking occasionally a leisure sweep above the marsh plants and crops.
7. *Accipiter nisus*, (L.) Common at Candahar.
8. *Nisastur badius*, (Lath.) Not uncommon.
9. *Aquila bifasciata* (?), Gray. A single specimen of what I believe to be this species was captured at Girishk in the month of December. Unfortunately, I took but a scanty memorandum at the time, and did not obtain a second specimen. “Plumage dark brown, two cinereous bands on the wings; feathers lanceolate on head and neck; cere yellow, as also feet; claws and bill black.
10. *Milvus ater*, (Lin.) The common Indian Kite or *Cheel* was seen throughout the summer in abundance, became scarce about November, and disappeared as winter set in. They returned early in spring, and

\* The “Churk” Falcon, killed near Ghuzni by Mr. Vigne (‘Personal Narrative of a visit to Afghanistan,’ &c., p. 136), is not the Churgh or ‘Cherrug’ (*F. tanarius*, v. *F. cherrug*, Gray), but apparently a young Peregrine.—E. B.

the young were once brought to me in the end of May, scarcely fledged; this is curious, as at Neemuch the Cheel breeds in December and January.

11. *Gypaetos* [*barbatus*? *G.*] *himachalanus*, nobis. This bird is identical with that which is so common throughout the Himalaya mountains, and possesses the dark pectoral band observable in the latter, and which (from its not being mentioned as characteristic of the European species) has led me to entertain doubts of its being the true *G. barbatus*.—They were common throughout the whole of Afghanistan, and were first seen soaring over the rocks of the Bolan Pass; they were again met with around Candahar, and at Girishk on the Helmund.—I never saw a single mature individual either in the Himalaya or in Afghanistan without the pectoral band, as you tell me is the case with Burnes's figure of an Afghan specimen.

12. [*Gyps bengalensis*, (Shaw):] *Vultur leuconotus*, Gray, in Hardwicke's 'Illustrations.' This bird was not uncommon around Candahar during the summer months, but departed as the winter approached. I saw it also at Girishk on the Helmund.

13. *Neophron percnopterus*, (L.) Common also during the summer, but departed in autumn.\*

14. [*Bubo bengalensis*, (Franklin).] Not uncommon among the rocks near Candahar; the yearling specimen sent was brought to me when only covered with down, and was fed with raw meat, and kept in a box till I left Candahar, when I killed and skinned it, but before it had attained its full plumage.

15. *Otus vulgaris*, Fleming. Common at Candahar.

16. *O. brachyotus*, (L.). This and the last were common among the ruins of the old city of Candahar, about three miles from the modern town; it was ruined by Nadir Shah.

17. *Ephialtes* [*lettia*?, Hodgson]. This did not appear to be plentiful, as I only saw one specimen; it was identical with one common at Neemuch and Bareilly, but whether it be so with the European *scops* I cannot say, as my specimen is lost.

18. *Athene bactrianus*, mihi, n. s.? [*Strix persica* (?) *Nouv. Dict.*

\* The three last mentioned species were seen on the 1st of March, two stages south of Candahar. The *Gypaetos* made the Vultures quit their prey.

*d'Hist. Nat.*, VII, 26.\* Length about 9 inches ; of wing  $6\frac{1}{4}$  inches, and tail  $3\frac{1}{2}$  inches : tarse  $1\frac{1}{4}$  inch. Plumage of the upper-parts somewhat rufescent clay-brown, with large round white spots on the feathers, more or less concealed, and wholly so on those of the middle of the back : coronal feathers with medial whitish streaks : face white ; some of the radiating feathers on the sides of the beak terminating in black vibrissæ : chin, throat, lower tail-coverts, and the tibial and tarsal plumes, white, also the fore-part of the under-surface of the wing : a longitudinal broad streak on each feather of the breast and abdomen : on the hind-neck, the white so predominates upon the feathers as to give the appearance of a half-collar : the great wing-feathers have broad incomplete pale bands, disposed alternately on their two webs ; and the middle tail-feathers have a double row of semi-alternating pale spots, passing into dull bands on the outer tail-feathers : beak (in the dry specimen) whitish ; and claws pale horn-colour]. Common among the rocks and ruins of old Candahar.

19. *Upupa epops*, Lin. The common Hoopoe. 'Hoodhood' of India.—This bird was scarce and only a summer visitor. I saw it, however, in the valley of Pisheen on the 6th March, when returning to this country.

20. *Coracias garrula*, Lin. This bird is very common during the summer months, but departs by the end of autumn : it arrives at Candahar in the middle of April. [Burnes obtained it in the Moultan]. Persian—"Subz Kullag ;" Pushtoo—"Sheen Tootee."

21. *Alcedo ispida*, Lin. Found on the banks of rivers all the year through.

22. *Merops apiaster*, Lin. European Bee-eater. These birds appeared at Candahar in the beginning of April, and left in the beginning of autumn.

23. *M. persica*, Lin. These came in with the last. [Two specimens in the Society's collection were obtained by Sir A. Burnes at Buhawalpore.]

24. *Cuculus canorus*, Lin. My specimens were shot at Quetta in April. The variety, *C. hepaticus*, was also obtained there in the same month.

\* The work cited is not accessible here ; but I have some impression that the species referred to is a small *Athene* (v. *Noctua*).—E. B.



25. *Cypselus apus*, (L.) Common Swift. As in England, this bird is later in appearing than the Swallow, and departs before it. It is common during the summer, coursing and screaming as they chase each other rapidly through the air. They were first seen on the 20th February [!].

26. *Corvus corax* (?), L. The Raven. Very common in Afghanistan, especially during the winter. I have marked it doubtful, because I have no specimen to refer to, but all its measurements, &c., agreed with Fleming's description; "Kargh."

27. *C. frugilegus*, L. The Rook. Found in large flocks during winter in Candahar, searching for food in the ploughed lands. The base of the bill is denuded as in the European bird.—They arrive in February, which is there the coldest month, and depart in March.

28. *Fregilus graculus*, (L.) The Chough. This is abundant during the winter months, arriving in November from the hills to the northward, and departing again about March. At Girishk on the Helmund they sometimes appear in hundreds about sunset, coming from the hills when the heats of day are passed, and settling among the swampy beds along the river, where they procure abundance of mollusca. Called 'Tsagh.'

29. *Pica caudata*, (L.) European Magpie. Is found all the year round from Quettah to Girishk, and is very common.—They breed in March, and the young are fledged by the end of April. The nest is like that of the European bird; and all the manners of the Afghan Magpie are precisely the same; they may be seen at all seasons. [The admeasurements of an Afghanistan Magpie are given in XV, 26. Capt. Hutton's specimen is larger, the wing of it measuring  $8\frac{1}{4}$  inches, and the tail 1 foot; but, on comparing it with several European specimens, there can be no doubt of the specific identity.\*]

\* The wing of Capt. Hutton's specimen is thus as long as that of my *P. media*, XIII, 393; but the latter species is distinct, and seems to be identical with Mr. Gould's subsequently named *P. sericea*, *Proc. Zool. Soc.* 1845, p. 2, from Chusan. I was positively assured that *P. media* was shot in the Chilian Andes; but as some Macao birds were purchased with the S. American collection which yielded *P. media*, I strongly suspect that these were not, in all instances (vide note to p. 471, ante), kept so distinct as was asserted, but that two or three of them had become mixed up with the S. American specimens. If I am right in this conjecture, there are now before me three well marked species of Asiatic Magpies,—viz. *P. bottanensis*, Ad Delessert, (*v. megaloptera*, nobis,) *P. media*, nobis, (*v. sericea*, Gould,) and the European *P. caudata*, (L.), from Afghanistan.

30. *Sturnus indicus*, Hodgson [*vulgaris*, Lin.] Arrives in the winter months only, and departs in spring.

31. *St. unicolor*, Marmora. These were far more numerous than *St. indicus*, and inclined to keep separate from them; the flocks being sometimes without a single spotted bird among them. Of five specimens in my possession, *all* are like those I send for inspection, but in life the bill is brown, not yellow. *St. indicus* remains only during the coldest months and departs as spring approaches; whereas the present species builds in the spring at Candahar, laying 7 or 8 blue eggs, and the young are fledged about the first week in May.\*

32. *Pastor roseus*, (L.) 'Goolabi Mynah' of India. These birds arrive at Candahar in immense flocks in the spring, but disappear with the mulberries which they devour greedily. Their stay is very short. [The same is remarked by Vigne, who, from observation, states it to visit Persia, Afghanistan, and parts of India, in the mulberry season.]

33. *Passer indicus*, Jardine, and Selby, [p. 470, ante]. Common in Afghanistan, and does not differ from the Indian Sparrow.

34. *P. [hispaniolensis]*, (Tem.)! Is found all the year through, and builds both in houses and trees. I formerly mistook this for the Tree Sparrow, *P. montanus*, (L.) [The occurrence of this N. African Sparrow, and of *Sturnus unicolor* (another common species of Barbary), in Afghanistan, is exceedingly remarkable: but I am as satisfied of the correctness of these identifications as can be, without actual comparison with African specimens.]

35. *Gymnoris [petronius]*, (L.) Arrives at Candahar in the latter end of April, and departs in autumn; it was far from common there, though probably among the gardens on the Helmund they were more plentiful. It frequents trees [like *G. flavicollis* of India].

36. [*Carpodacus crassirostris*, n. s. (p. 476, ante).] Found at Quetta in spring.

37. *Carduelis caniceps*, Vigors. Common at Quetta and Candahar in winter and spring.

38. [*Loxia curvirostra*, (L.) Of this I have seen a living specimen, besides skins, from Afghanistan.]

39. *Emberiza [icterica]*, Eversh.] This bird arrives at Candahar in

\* Vide Mr. Drummond's Notice of this species in Barbary.—*Ann. Mag. N. H.*, XVI, 104.—E. B.

the beginning of April, and departs in autumn. It is likewise seen in considerable flocks at Neemuch during summer.

40. [*E. Buchanani*, nobis, XIII, 957.] Found at Candahar in summer.

41. [*Melanocorypha torquata*, n. s. (p. 476, ante).] This bird is a winter visitor, and is said to come from Bokhara: the Afghans keep them in cages.

42. [*Alda arvensis*, (?), L. A bad figure among the 'Burnes drawings' seems to refer to this species, as occurring in Afghanistan. Mr. Hodgson sent it from Nepal, by the name *A. dulcivox*.]

43. [*Calandrella brachydactyla*, (Tem.)] Found in flocks at Candahar in winter.

44. *Certhilauda chendoola*, (Franklin;) referred by Mr. G. R. Gray to *Alda cristata*, Lin. Very common during winter in Afghanistan and Scinde: it is likewise abundant in all the north-western provinces of India.

45. *Motacilla alba* [vera], Lin. Found during the spring months.

46. *M. boarula*, Lin. Not uncommon at Candahar during the autumn, winter, and spring months; but departs when the great heats of summer set in.

47. *Budytes citreola*, (Pallas.) Winter and spring.

48. *B. melanocephala*, Savi. In spring also.

49. *Myiophonus Temminckii*, Vigors. Shot in December near Candahar, and identical with the Himalayan bird.

50. *Merula vulgaris*, Ray. The Blackbird. I saw one specimen only of this bird, which was a female, agreeing in every respect with the description of the European species. It was captured in the fruit-gardens on the Argandab river, near Candahar, in December. [I also have seen a female Blackbird from Afghanistan, which I considered to be *M. vulgaris*.]

51. *Turdus atrogularis*, Tem. Dadur, Quetta, Candahar.

52. *Pratincola caprata*, (L.) Found all the year.

53. *Ruticilla tithys*, (L.) This is a common bird, and found all the year through. [*Non vidi*.]

54. *Cyanecula suecica*, (L.) Is a summer visitor at Candahar. (No red spot on the blue throat!)

55. [*Calamoherpe agricola*, Jerdon. Obtained by Sir A. Burnes at Cabool.]



56. *Lanius excubitor*, Lin. Is very common around Candahar. This, and not *L. lahtora*, is the bird I formerly mentioned as seizing the *Mustela sarmatica* by the nose (vide XIV, 348, on Afghan mamalia). It is chiefly seen in winter.

57. *Lanius erythronotus* [affinis]. Is also common at Candahar. [Two specimens forwarded by Capt. Hutton resemble *L. erythronotus*, Vigors, in size, but *L. caniceps*, nobis (XV, 302), in colouring.\*]

58. *Hirundo rustica*, Lin. Chimney-Swallow. Was first seen on the wing at Candahar on the 8th February, 1840, and 5th February, 1841. —They are abundant throughout the summer months, and build in the open rooms, in temples, &c. They retire in October. The advent and departure both depend upon the mildness of the seasons, so that they are sometimes later, sometimes earlier, than above stated. It is identical with the English Swallow. I have seen them on the wing when the thermometer stood no higher than  $36^{\circ}$ .—On the 8th February, 1840, when I saw the first Swallow of that year, there had been hard frost and ice during the night, but the morning was fine and sunshiny. On the 16th of that month, the thermometer stood at  $38^{\circ}$ , and on the 17th again at  $36^{\circ}$ ; yet Swallows were twittering and on the wing, coursing after insects, which are abundant at that season. This fact however would seem to argue that migration does not take place with these birds so much from a dread of encountering cold, as because their natural food begins to fail them in the autumnal season. But where do they migrate to, for we have them at Candahar precisely at the same seasons as in England? Do they travel to the Eastern Isles, or to the regions of Southern Africa, or where?† I have seen another species at Mussoorie also on the wing on the 20th February, 1842, when frost and ice were on the ground, though the morning was fine and sunshiny.

59. *H. riparia*, (?) Lin. A small grey Swallow was seen near Quetta in March; I observed several on the wing, near the western entrance of the Bolan Pass,—greyish-brown above, white beneath; tail squared. Apparently less than *H. urbica*. [Specimens of *H. riparia* (vera) are sent by Captain Hutton from the banks of the Sutlej.]

\* *L. caniceps* occurs abundantly in the same localities as *L. nigriceps*, Franklin, and without intermingling, so far as I have seen, and the latter occurs together with *L. erythronotus* in the sub-Himalayan region; but Lord A. Hay procured a specimen at Benares (XV, 303), which is just intermediate to *L. erythronotus* and *L. nigriceps*.—E. B.

† I have never seen *H. rustica* (vera) from the Oriental Archipelago.—E. B.



60. *Sitta*—? Of this I never obtained a specimen, although they were exceedingly common among the rocks behind the old ruined city of Candahar; they frequented rocks, however, and not trees, and I venture to term it a Nuthatch on account of the similitude in plumage, size, shape, and motions;—the bill appeared to be short, strong, pointed and black; the upper parts light slaty grey-blue, with a black stripe through the eye from the forehead or base of bill; under parts buff or ferruginous white. With the exception of appearing larger, it is very like a Nuthatch we have seen at Mussooree. [Temminck, if I remember rightly, gives a *S. saxatilis*, from Eastern Europe.]

61. *Tichodroma muraria*, (L.) This beautiful little bird was very common on the rocks near Candahar, and in other parts of Afghanistan. It is identical with the European and Himalayan birds.

62. *Malacocercus* [*Huttoni*, n. s. (p. 476, ante.)] Common.

63. *Columba intermedia*, Strickland. Common blue Pigeon. Abundant; breeding in wells and ruins.

64. *Turtur risorius*, (L.) Common during the summer.

65. *T. suratensis*, (Lath.) Common during the summer.

66. *Phasianus colchicus*, L. This specimen was sent to me from Herat, by Lieut. North of the Bombay Engineers: it is said to be not uncommon in the neighbourhood of that city. [Unfortunately, it is not a typical example of its race; having much white upon its wings (which have been clipped short), and a considerable proportion of the rest of its plumage resembles that of an old or barren English hen Pheasant, that had thrown out the masculine plumage, as is not unfrequently the case: the more perfectly formed feathers proper to the male sex resemble those of an English cock Pheasant; and the rich bronze-rufous of the rump and upper tail-coverts is wholly unmixed with green. The size is that of an English hen bird; but the spurs on the tarsi resemble those of a young cock.]

67. *Tetraogallus* [*caucasicus*, (Pallas), apud G. R. Gray: *T. himalaianus*, G. R. Gray; *T. Nigellii*, J. E. Gray. These fine birds are common in the Huzarrah mountains and other high ranges;—they are called *Kowk-i-durra*, or Partridge of the ghâts or passes. Sometimes they are sold in the markets of Cabool. I possessed four living birds at Candahar, which were kept with wings cut in a large courtyard, and lived well for many months. I gave them to a friend, Capt.

M'Lean of the 67th Regt. N. I., who wished to take them home to the highlands of Scotland, but he unfortunately died on his way back to India, and I know not what became of the birds. They are common on the snowy passes of the Himalaya and in Tartary, rising in coveys of 10 to 20, and usually having a sentry perched high on some neighbouring rock, to give warning of danger by his loud and musical whistle. They are difficult birds to shoot. I found them usually in patches of the [so called] Tartaric furze.

68. *Perdix*? [*Bonhami* (?), Fraser, *Proc. Zool. Soc.* 1843, p. 70. The *Seesee* Partridge: figured in the 'Bengal Sporting Magazine' for October, 1843.] Frequents rocky situations, and is abundant. The first were seen in the Bolan Pass. [Capt. Hutton has sent no specimen of this bird; but I suspect it to be the species described by Mr. Fraser, late of the Zoological Society, and which was procured at Teheran. I took the following description of the Afghan *Seesee* from some fine specimens prepared by Capt. Duncan of the 43d Regt. N. I., who brought the bird alive from Afghanistan, and kept one up to the time of his departure for England in the beginning of 1845. The figure in the 'Bengal Sporting Magazine' was taken from his living specimen.

"This seems a remarkable species, connecting true *Perdix* and *Perdicula* with *Caccabis*, and I think *Lerwa*, or the Himalayan Snow Partridge (*L. nivicola*, Hodgson): it does not, however, well range in either, though it is probable that other species will be eventually found with similar characters.\* The tarse of the male are devoid of tubercles in place of spurs.

"Length about 10 inches; of wing 5in., and tail  $2\frac{1}{2}$ in.; bill  $\frac{5}{8}$ in., and tarse  $1\frac{1}{8}$ in., the middle toe and claw  $1\frac{1}{4}$ in. Colour of male, isabella-brown above, with little trace of markings, though each feather of the back when raised is seen to have several pale dusky cross-rays; on the rump, these become obsolete or very nearly so, except along the shaft of each feather, where they assume the appearance of a series of small linear blackish spots: upper tail-coverts and medial tail-feathers minutely but obscurely mottled, the three or four outer tail-feathers

\* It should be remarked that I had no opportunity of actually comparing the *Seesee* with other species. It has probably an affinity with the *Tetrao kakerlik* of Gmelin; and Mr. Fraser writes, of his *P. Bonhami*,—"This species is nearly allied to *P. Hayi*, Temm. p. c., but is readily distinguished from that bird by the black stripes about the head of the male." Mr. Fraser neglected to give the admeasurements of his *P. Bonhami*.

uniform light chesnut-brown, a little mottled at tip, and each successively more so to the middle ones. Crown ashy, the feathers brownish at tip; and cheeks and throat purer ashy, becoming albescent towards the chin: ear-coverts silky-whitish, pure white anteriorly towards the eyes, as are also the lores; and above the lores, eyes, and ear-coverts, is a black streak meeting its opposite across the forehead: the sides of the neck are mottled; the breast uniform isabella-brown, having a shade of lake, the feathers margined with faint russet; and those of the flanks may be described as whitish tinged with lake, the larger passing into black along each lateral border, and the smaller edged inwardly with chesnut-brown, and some of them with black at their extreme margin: under tail-coverts pale chesnut: primaries light dusky within, their outer web isabelline, with dusky bars and pencilings. Bill and feet pale red.

“The female is much more mottled both above and below, and is devoid of the grey on the crown and throat, of the black supercilium, and of the characteristic markings of the flanks: but there is a pale streak from the eye along the side of the occiput. Upper parts light dusky, rayed with isabelline, the darker portion of the rump feathers blackish along their shafts; the coronal feathers are similarly rayed, but present a mottled appearance at their surface; and the tertiaries are prettily variegated, presenting a series of isabelline spots along their middle: entire under-parts minutely mottled, paler on the throat and belly, and presenting on the flanks indications of the white central portion of the corresponding feathers of the male. A young chick, with pale sandy-coloured down on the head, back, and under parts, has the scapularies and wing-feathers minutely mottled sandy, with triangular pale spots on the scapularies and tertiaries, and conspicuous dark bars on the outer webs of the primaries.”

This bird inhabits “rocky places covered here and there with brush-wood, and feeds much on wild thyme. They are found in coveys, and when sprung, rise with a startling noise like our Bush Quails” (*Perdica rubiginosa* and *P. cambayensis*.) “Sportsmen reckon them easy to kill, and it is said that they are delicious eating. The name *Seesee* expresses their call;”\* which last statement militates against the sup-

\* Bengal Sporting Magazine.



position of the identity of this bird with the *Kakerlik*, which is also named from its cry.

69. [*Caccabis*] *chukar*, (Vigors). Very common among the hills. "Chowk."

70. [*Francolinus vulgaris*, Stephens, pale (individual?) variety.] This was brought to me as a true Black Partridge (*Fr. vulgaris*), but it is evidently distinct, and is probably the *Perdix pallida*, Gray, of Hardwicke's 'Illustrations.' The Black Partridge is called "Taroo" by the Afghans; but as I never saw a specimen killed during a two years' residence in the country, I am inclined to think that the bird so called is the one here alluded to. [*Perdix pallida*, Gray, is evidently a pale variety of *Francolinus pictus*, (Jardine and Selby), or *P. Hepburnii*, Gray, as that systematist places it, viz. "*P. Hepburnii*, var. *pallida*." Capt. Hutton's bird I consider to be an analogous (and probably individual) pale variety of the female *Fr. vulgaris*.

71. *Coturnix communis*, Bomaterre. Quails arrive about the end of March, and in summer when the crops are ripening are very numerous. They are then snared in nets by the aid of a decoy whistle, and are kept singly in cages for fighting, of which sport (?) the Afghans are extremely fond, every urchin being seen with a Quail in his hand during that season. The rage for gambling is so great among the people, that instances have been known of a husband pawning his wife to pay his gambling debts, and if not punctually redeemed she becomes the property of the holder, and is either kept or sold as he pleases!

72. [*Pterocles arenarius*, (Pallas.) *Khyrgut*, or *Syah-reem*; also called *Tuturuk* in Pushtoo, expressive of the bird's cry; and *Bovra kurra*, or "black breast." Burnes figures both sexes, from Cabool: and the Society possess an Afghanistan specimen.]

73. *Pt. exustus*, Tem. Common throughout the southern parts of Afghanistan. I have seen their nests on the bare ground in August, and the young ready to fly by the end of September. They occur also in Scinde, and in the Bhawalpore (or Daoodpootra) country. "Sasseeneea."

73, a. *Struthio camelus*, L. Ostrich. This bird is said by the Afghans to inhabit the great southern desert which skirts Afghanistan and runs onward into Persia. I suspect, however, the story has arisen from the circumstance of its eggs being brought round via



Scinde from Bombay: these are hung up in tombs and mosques. None of my informants had ever seen the bird. Called "Shootur-moorgh," *i. e.* "Camel-fowl."

74. [*Houbara Macqueenii*, (? Gray.)] These handsome birds are common on the bare stony plains of Afghanistan, and sometimes occur in small packs of five or six together. They fly heavily, and for short distances, soon alighting and running. They remain all the year. [The "Dugdaoor," or Afghan Bustard. According to Burnes, "one foot nine inches high, and forty-two inches from tip to tip." It essentially resembles *H. Macqueenii*, Gray, of the outskirts of the Scindian and other deserts of western India, except in the particular of possessing a remarkable crest; falling under the subdivision *Houbara* of the Prince of Canino, which is distinguished by the splendid ornamental tufts that adorn the sides of the neck in both sexes, by the shortness of the legs, &c. The only other known species is the *Otis houbara*, auct., of Spain and Barbary, now ranging as *H. undulata*, (Gm.)

A superb male, kindly lent to me some time ago, by Capt. Duncan, measured about 30in. in length, of which the tail measured 10in.; wing  $15\frac{1}{2}$ in.; bill to forehead  $1\frac{1}{2}$ in., and to gape  $2\frac{3}{4}$ in.; tarse  $3\frac{3}{4}$ in. Head beautifully crested, a series of lengthened slender feathers rising along the central line of the forehead and crown, and continued to the occiput; the foremost of them shorter than those immediately following, which latter to above the region of the eyes measured 3in. and upwards in length, and were remarkably firm in texture towards their base, and moderately so near the tips, while those behind them to the occiput, where they gradually diminish, are of much softer and hair-like texture, with disunited webs: these latter are wholly pure white; and the former are white, with the terminal fourth black and soft, the foremost of all having their extreme tips mottled buff, like the shorter and ordinary feathers directly above the base of the bill. The sides of the neck have also handsome ornamental tufts, divided like the crest into two series: a broad band of silky black feathers (from  $1\frac{1}{2}$  to 2 inches long) commences below the ear-coverts, and extends for some distance down each side of the neck, and behind the lower half of this is thrown out the first or upper series of beautiful neck plumes, which are 6in. long, and have the basal two-thirds white, with scanty hair-like disunited webs, and their terminal portion expanded and spa-

tulate, of a glossy black colour, with connected webs; the second and larger series being still longer and wholly white, the feathers soft and dense, straight, or rather a little curved inward, and very fine and flexible. Upper-parts pale buff, albescent upon the wing-coverts, and a little so elsewhere; somewhat deeper about the middle of the back, and much deeper on the tail and its upper coverts, which nearly resemble in colour the upper-parts of *O. tarda*: all being delicately and minutely pencilled with black, and having a subterminal mottled black band, and one or more similar additional bands, (according to the size of the feather), which in general are concealed by the feathers which successively impend; the upper tail-coverts have narrower and less mottled black cross-bars, more or less ashy, and placed distantly apart; and the spread tail is beautifully marked with a series of ash-coloured bands, appearing from contrast bluish, all but its middle feathers being broadly tipped with cream-white. The lateral portions of the crown are minutely mottled buff and black; the cheeks are white, with black shafts and tips to the feathers; throat white; upper part of front of neck slightly ashy; and the lower portion of the neck, with the breast, are of an uniform delicate pale bluish ash-colour: rest of the lower parts white, as is likewise the under surface of the wings, but the lower tail-coverts are a little barred. The primaries are white at base, and black for the terminal half or more, extending further upon the outer web; and from the termination of the black to that of the emarginated portion of the wing, there is a slight tinge of buff: the shorter primaries and secondaries are tipped with white, together with the great range of wing-coverts; the remainder of which, as also the winglet, are black. Upon the small coverts of the wings, which are coloured uniformly with the back, but paler, a large black spot occurs, in place of the subterminal band of the dorsal feathers, but for the most part remains concealed when the plumage is adjusted: and the bars of the interscapularies have likewise a confusedly macular appearance. The bill is horn-coloured; and the legs appear to have been yellowish-green.

Of the Indian *H. Macqueenii*, an indifferent figure occurs in Hardwicke's 'Illustrations;' and it is also represented as the "Hurriana Floriken" in the 'Bengal Sporting Magazine' for September, 1833, where the only description is given of it that I have seen. "Hurria-

na," observes the writer, "has also its *Floriken*, in addition to the *Bustard* [*Eupodotis Edwardii*, (Gray,) v. *nigriceps*, (Vigors),] there numerous; but it is a very different bird from the *Floriken* of Bengal [*Sypheotides bengalensis*, (Gm.), v. *himalayanus*, (Vigors);—the *Floriken* of Southern India being the *S. auritus*, (Latham), or *Leek* of Bengal.]\*\*\* The sexes are alike, and some specimens differ a little from each other in their plumage. The drawing represents a male, which weighed  $3\frac{1}{4}$ lb., was  $25\frac{1}{2}$ ins. in length, and 4ft. broad." This account being by a well known sportsman and accurate observer, the statement respecting the similarity of the sexes is entitled to all credit, as likewise that regarding the sex of the specimen figured by him: otherwise, so nearly does this Indian bird resemble that above described from Afghanistan, except (so far as hitherto appears) chiefly in being devoid of the crest, and in having the upper two-thirds of its ornamental neck plumes wholly black, that I incline to regard them as identical, presuming the crest to be merely a seasonal adornment, and that some variation in the colour of the nuchal tufts might occur in different individuals.

The only Indian specimen that I have seen was a beautiful female, procured at Hansi in the month of December, and obligingly forwarded for my inspection by Capt. Boys (of the 6th Cavalry). This measured, when fresh, "25in. in length, 4ft. in extent of wings, and weighed 3lb. 6oz.;" length of closed wing 14in., of tail 9in., tarse  $3\frac{1}{2}$ in., and bill to gape  $2\frac{1}{8}$ in. "Irides bright yellow: bill blackish-horny, with greyish black nostrils, the base of the lower mandible whitish: and legs greenish-yellow." This specimen agreed tolerably well with Hardwicke's figure, except that the mottled black patches on the upper parts are much smaller and more numerous, and scarcely appear at all upon the wings, which should have been coloured paler; the pencilling in front of the neck is much more delicate; and the tail is banded with light ash-colour (appearing blue), slightly bordered with black. Comparing it with the foregoing description taken of the Afghanistan specimen, I noted that the minute description of the upper-parts, wings, and tail, there given applies equally to the present bird; but "though the coronal feathers are all, in the mass, considerably lengthened, there is no indication whatever of the greatly developed, and abruptly rising, medial crest of the other, the plumes composing which are singularly



firm and wiry towards their base. The lower third of the lateral neck-tufts are white, and of similar texture in both; but the front of the neck, below the dull white throat, of the Hansi specimen is uniform pale buff, minutely freckled with black, and at its base are some lengthened plumes of a pale ash-colour impending the breast. Unfortunately, I had not the opportunity of comparing the two together, nor either of them with an Afghanistan specimen which is now likewise forwarded on loan by Capt. Hutton: but this third specimen appears to be intermediate to the other two, agreeing more with the description of the Hansi bird, but having a slight crest, or apparently the remains of a crest in process of being shed, confined to the forehead only; and there are but few traces of white upon the black or upper tuft of lateral neck plumes. I am, accordingly, more than ever inclined to regard the crest as a distinctive characteristic of the breeding season only, when it would probably be more developed in the male sex than in the female.

According to the writer in the 'Sporting Magazine,' the *Hurriana Floriken* "frequents the same country as the Bustard [*Eu. Edwardii*], or dry sandy plains where there is a little grass, and it is also found in wheat and grain fields. The native name for it is *Tilaor*. Its flesh is exceedingly tender, and is so covered with fat, that the skins are with difficulty dried and preserved." Capt. Boys, during the many years that he had collected in the Upper Provinces, never obtained more than the one specimen noticed; but in Scinde it is tolerably numerous.

75. [*Lobivanellus*] *göensis*, (Gm.) Near Quetta.

76. [*L. (?) leucurus*, (Licht.) Procured by Burnes at Cabul. Termed "Chizee."]

77. *Vanellus cristatus*, Meyer. [Termed "*Alutye*," or "*Meekhcao*," at Cabul.]

78. [*Hiaticula philippensis*, (Gm.); *Charadrius minor*, Meyer. Procured at Cabul by Burnes; and designated "*Tillah Chusmuck*."]

79. [*Hæmatopus ostralegus*, L. "*Teitah-wuck*" of Cabul. Also procured by Sir A. Burnes."]

80. [*Philomachus pugnax*, (L.)] Common all the year.

81. [*Tringa subarquata*, (Gm.) A nameless figure, from Cabul, among the 'Burnes drawings,' appears to refer to this species; but it



is one of the most faulty of the series. It seems, however, to be a common bird throughout Asia.]

82. *Tringa* [*minuta*, Leisler]. Shot at Candahar. [Obtained also by Burnes at Cabul.]

83. *T.* [*Temminckii*, Leisler. Also obtained by Burnes at Cabul.]

84. [*Limosa ægocephala*, (L.)] Common all the year.\*

85. [*Totanus calidris*, (L.) Cabul.]

86. *T.* [*stagnatilis*, Bechstein: *T. Lathamii*, Gray; *Limosa Horsfieldii*, Sykes.] Common all the year.

87. *T.* [*glareola*, (Lin.)] Common all the year.

88. [*Numenius arquata*, (L.) Cabul.]

89. *Scolopax rusticola*, Lin. The Woodcock is very common at Quetta and Candahar, arriving in November and departing in May: they probably only retire during the summer to the more northern districts, in order to avoid the hot wind and great heats of the southern tracts at that season. A female measured, over all, 16in.; and weighed 13oz. [I have obtained two fine specimens of the Woodcock in the immediate vicinity of Calcutta, and have heard of one or two others having been shot, though at long intervals.]

90. [*Gallinago scolopacinus*, Bonap.:] *Scolopax gallinago*, Lin. Common Snipe. Abundant from Quetta to Girishk; at Candahar they gradually disappeared (or became scarce) to the beginning of April.

91. [*G.*] *gallinula*, (L.) Jack Snipe. As common as the last.

92. *Rhynchea bengalensis*, (Gm.) Also occurs at Candahar.

93. [*Falcinellus igneus*, (Gm.); *Tantalus falcinellus*, Lin. "Boozuk" of Cabul (Burnes).]

94. [*Ciconia nigra*, Belon. Procured by Burnes at Cabul.]

95. [*Platalea leucorodia*, Lin. Also procured at Cabul by Sir A. Burnes.]

96. [*Ardea cinerea*, Lin. Ditto ditto.]

97. [*Herodias alba*, (L.)] Found all the year on the banks of the rivers.

98. [*H. garzetta*, (Lin.) Procured by Sir A. Burnes at Cabul, and with the last called *Ookar*.]

\* N. B. This and *Totanus stagnatilis* were sent with the same number, and remark attached to that number.—E. B.

99. [*Ardeola minuta*, (L.)] Found at Candahar in winter, along the banks of water courses.

100. *Botaurus stellaris*, (L.) Found along the banks of the larger rivers, as the Argandab and Helmund.

101. *Nycticorax griseus*, (Lin.) Found in the winter on the banks of the larger rivers.

102. [*Grus leucogeranos*, Pallas. "Syakbal" of Cabul, where procured by Sir A. Burnes.]\*

103. [*Anthropoides virgo*, (Lin.) Figured by Burnes as the "Shuck Duruck" of Cabul.]

104. [*Ortygometra pratensis*, (L.) British Corn Crake. A common summer visitor in Afghanistan, from which country specimens were brought by Capt. Duncan.]

105. [*Porzana maruetta*, (Brisson). "Teerturuk" of Cabul, where procured by Burnes.] Shot at Candahar.

106. [*P. pygmæa*, (Naum.): *Gallinula Baillonii*, Vieillot. Also procured at Cabul by Sir A. Burnes.] Shot at Candahar.

107. [*Gallinula chloropus*, L.] Shot at Candahar in winter. ["Kushkul" of Cabul, a name also applied to the next species.]

108. *Fulica atra*, Lin. The Coot was very common among the reeds and marsh plants in the ditch surrounding the old ruined city of Candahar, and in marshy places generally. It was most frequent in winter and spring.

109. [*Anser cinereus*, Meyer.] A winter visitor only at Candahar.

110. *Casarca rutila*, (Pallas.) The Brahminee Duck is found at Candahar only during the winter. ["Soorkheb" of Cabul.]

111. *Tadorna vulpanser*, Fleming. This beautiful bird is only a winter visitor. (The plate in the 'Naturalist's Library' gives it a high knob at the base of the bill, but in my specimen this is not apparent, nor is it mentioned in the letter-press of the above work).† ["Mekaz," "Alikaz," and "Shah Moorghabee," of Cabul.]

112. *Anas boschas*, Lin. Mallard. Common in winter. ["Subzurdan" of Cabul.]

\* The "Sarrus" (*Gr. antigone*) was seen on the Indus, but I did not meet with it in Afghanistan.

† The base of an old Shieldrake's bill is a little raised, but not to the extent represented in the figure cited: in the dry specimen, this bulge sinks to a concavity.—E. B.

113. *A. acuta*, Lin. The Pintail Duck is also common during the winter months. ["Seik-doom" of Cabul.]

114. *A. penelope*, Lin. The Widgeon. A winter visitant at Candahar, as indeed are all these Ducks, disappearing gradually to the end of April.

115. *A. crecca*, Lin. The Teal is very common. ["Chooraka" or "Jooruka" of Cabul.]

116. [*A. querquedula*, L. The Gargany. "Seeteh-doom" of Cabul, where procured with all the other Ducks mentioned, by Sir A. Burnes.]

117. [*A. stepera*, Lin. The Gadwall. "Syah-doom" of Cabul.]

118. *Spatula clypeata*, (Lin.) The Shoveller. Very common during the winter months. [The male is thrice figured by Sir A. Burnes, as the "Kachack-nol" and also the "Aleeput," of Cabul.]

119. [*Fuligula rufina*, (Pallas). Red-crested Pochard. "Nool-gool" of Cabul.]

120. [*F. ferina*, (L.) Dun Pochard. Male and female figured by Sir A. Burnes as the "Soorksir," and both sexes also as the "Gho-tye," of Cabul, which latter name is likewise applied to the Smew.]

121. [*F. nyroca*, (Guldenstadt.) White-eyed Pochard. Common during the winter.

122. *F. cristata*, (L.) Common. ["Sonah," and "Uhluk" (?), of Cabul.]

123. *Clangula glaucion*, (L.) The Golden-eye. Common in winter.

124. [*Mergellus albellus*, (L.) I saw only one specimen at Candahar, but heard that it was common in winter near Ghuzni. ["Gho-tye," and "Chota Khoruk," of Cabul; from which may be inferred that the large Mergansers are probably termed "Khoruk."]

125. [*Larus fuscus*, L. : *L. flavipes*, Meyer. The adult and young are figured by Burnes from Cabul.]

126. *Xema ridibundus*, (L.) Shot at Candahar, flying over a jheel south of the town.

[Two figures occur among the 'Burnes drawings' of a species of *Xema* Gull (apparently), labelled "Bad-khor," said to be "shot at Cabul in the middle of February : a bird of passage." They are, however, so unscientifically drawn, that I can hardly venture upon a description of them. The length is mentioned to have been 17 in., and alar expanse 3 ft. Adult, white, with an ashy mantle, and deep roseate

tinge on the breast; no dark spot behind the ear-coverts (as in the *Xema* group in winter colouring): the primaries are represented as black, with white terminal margins: bill and feet deep rose-red; and irides crimson,—the bill evidently represented much too slender. Young generally similar, but less pure in its colours; and the middle of the wing longitudinally, brownish, with pale edgings to the feathers; tail, also, of the young bird, dark at the end.]

127. *Podiceps* [*philippensis* and *Colymbus minor*, Gmelin]. This bird is common in the marshes and water pools south of Candahar, during the winter.

128. *Pelicanus onocrotalus*, Lin.: The Pelican. Length of a specimen in my possession, 5ft. 0½in.; breadth 8ft. 11in. Bill 1ft. 2in. long, and 2½in. in breadth: tibia 4½in., feathered to within 1½in. of the tibial joint; length of middle toe 5½in.\* Iris brown-red or dark blood-colour. Skin of the face pale flesh-colour. Longitudinal centre or ridge of upper mandible, dull blue; the tip or nail, hooked, and of a blood-colour; margins red and yellowish: sides of under mandible dull blue. Pouch dull yellow; legs and feet flesh-coloured or pinkish. Plumage white, with a strong pink or roseate tinge on the head and neck; fore-part of breast dirty white: quills cinereous-black; head subcrested.

These birds arrive in the beginning of March, in large flocks on their way to the eastward. The specimen from which the above description was taken, was shot in a pool of water at Candahar; it was alone, and from its emaciated state appeared to have alighted from fatigue. The Afghans, who are great lovers of the marvellous, declare that when a flock of these birds alight on a piece of water they entrust their safety during the night to a few sentries, who hover near them on the wing, wheeling around the water and keeping watch until near the dawn, when being overcome by fatigue they descend and join their sleeping companions, and from the irksomeness of their long watch are soon wrapped in a profound sleep. This is the time when the wary fowlers approach with their nets, and bearing long sticks; they then attack the panic-stricken sleepers and succeed in knocking numbers on the head before they are well aware of the danger which besets them.

\* Both the Indian Pelicans, *P. onocrotalus* and *P. philippensis*, which are equally common in Lower Bengal, are subject to much variation of size.—E. B.



Several were brought in to Candahar, which had been found sitting on the rocks far from any water, and from their offering no resistance to their captors, they had evidently alighted from fatigue, and would probably have perished in a few hours. When approached, if unable to escape, they open wide the beak and strike at the intruder, making a loud snapping noise as they strike the mandibles together. I had two of these birds alive in a small tank, and have often seen them catch and swallow whole a fish of seven and eight inches in length. It is first caught within the pouch, and then thrown up into the air and caught again so as to bring the head foremost into the pouch and thus swallowed; the fins of the fish in this case are prevented from offering any impediment to its passage down the throat. They often dip the beak into the water as they sail along, and suffer the pouch to become filled with water; they then close it, and press the pouch against the breast, by which means the water is gradually expelled at the edges of the closed mandibles, and the water insects, small fish or other prey, are retained and swallowed.

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It is not to be supposed that these are nearly *all* the birds of the Southern parts of Afghanistan; but my arduous duties in the Pay and Commissariat Department of Shah Soojah's force prevented my doing more than is above recorded, and you must overlook many omissions as well as scantiness of information, when I assure you that I was generally at the desk from sun-rise to sun-set!

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*A Description of the Glaciers of the Pindur and Kuphinee Rivers in the Kumaon Himalaya.—By Lieut. R. STRACHEY, Bengal Engineers.*

The existence of Glaciers\* in the Himalayas, being apparently still considered a matter of doubt by the Natural Philosophers of Europe, I have thought that some account of two most decided Glaciers, which I have just visited (May 1847) in these mountains, in about Lat. 30° 20', may not be uninteresting.

\* For the benefit of those persons, who now read of a Glacier for the first time, I have in an appendix given a short account of their chief peculiarities, which I should recommend them to look at first.

As there is probably nothing specially worthy of note in these individual Glaciers, I wish to explain, that my object being to show that these phenomena exist in the Himalaya, under forms apparently identical with those observed in the Alps, it has been necessary that I should enter into details, which under other circumstances would have been superfluous. As these are the first Glaciers that I have ever seen, it is right to add, that I am only acquainted with those of the Alps, through the medium of Professor Forbes's accounts, and that as I lay no claim to originality, I have not scrupled to adopt freely the ideas, and perhaps expressions, of a person so infinitely better acquainted with these phenomena than I can be. To guard against mistakes I would also mention, that these Glaciers were selected for examination only on account of their accessibility, and that consequently no inferences should be drawn from them, of the general extent of Glaciers in the Himalaya.

The Pindur river (vide accompanying map,) is the most easterly tributary of the Bhagiruttee, or that stream of the Ganges that issues into the plains of India at Hurdwar. It rises from the south side of one of the great snowy ranges of the Himalaya, which contains the cluster of Peaks, (No. 10 to 15 of the Indian Atlas, sheet No. 66,) of which Nunda Devee\* is the centre. At the head of the Pindur is one of the Glaciers I am about to describe; the other gives rise to the Kuphinee, the first considerable affluent of the Pindur.

The Pindur and Kuphinee, rising on opposite sides of the Peak called Nunda Kot, unite about 7 miles south of it. A small tolerably level space between them close to their confluence, is called Diwálee. The lower end of the Glacier of the Pindur is about 8 miles, and that of the Glacier of the Kuphinee about 6 miles above this place.

\* The heights of these peaks are as follows :

|        |       |               |                                                  |
|--------|-------|---------------|--------------------------------------------------|
| No. 10 | 15805 | English feet. | } Vide Asiatic Researches,<br>Vol. XIII. p. 306. |
| 11     | 20758 | "             |                                                  |
| 12     | 23531 | "             |                                                  |
| 13     | 22385 | "             |                                                  |
| 14     | 25741 | "             |                                                  |
| 15     | 22491 | "             |                                                  |

No. 14, which I call "*Nunda Devee*," is the "*Jowahir*" of the Maps. "*Jowahir*" or more correctly "*Jwar*" or "*Joohar*," is the name of a district (Purgunnah) which consists of the upper part of the valley of the Goree River. Nunda Devee is on the boundary of this district, and has been erroneously named after it in many maps, the word "*Joohar*" being never applied to designate this particular peak, though the portion of the range in which it is, has undoubtedly been called the mountains of *Joohar*.

The valley of the Pindur, at the termination of the Glacier, is about a mile across between the precipitous mountains that bound it. From the foot of the rocks on either side, its bottom slopes inwards with a moderate inclination, leaving in the middle a hollow about 300 yards wide and 250 feet deep, with very steep banks, at the bottom of which flows the river. This comparatively level space, between the central hollow in which the river runs and the precipitous sides of the valley, its surface running nearly parallel with the present bed of the river, but from 200 to 300 feet above it, can be distinctly seen for a mile or more below the end of the Glacier. The plateau itself, as well as the steep banks between it and the bed of the river, are considerably cut up by water courses running across them from the sides of the valley, but every where they have an almost perfectly rounded outline.

The whole of the bottom of the valley is covered with grass, or those species of plants that grow in these elevated regions, excepting where beds of snow, rocks, or the debris of the mountains interrupt the vegetation.

The Glacier (Fig. 2,) occupies about  $\frac{2}{3}$  of the whole breadth of the head of this valley, leaving between itself and the cliffs on the east, an open grassy slope, which extends along the foot of the moraine for upwards of a mile and a half above the source of the river, and which seems to be a continuation of the plateau I before mentioned.

The first appearance is remarkable; it seems to be a vast rounded mass of rocks and ground, utterly devoid of any sign of vegetation, standing up out of a grassy valley. From the foot of its nearer extremity the river, even here unfordable, rushes in a turbid torrent out of a sort of cave, the top of which when I saw it was but a few feet above the surface of the water. The end immediately over the source of the river is very steep and of a dull black color. It is considerably fissured; the rents appearing to arise from the lower parts tearing themselves from the upper by their own weight. On a closer examination, this abrupt end proves to be a surface of ice, covered with sand and gravel, and curiously striped by the channel made by the water that runs down it as it melts. Behind this the glacier rises less steeply, like a bare gravel hill to its full height, which is probably about 500 feet above the water of the river, when it leaves the cave; in some places however are seen great fissures both vertical and horizontal, the



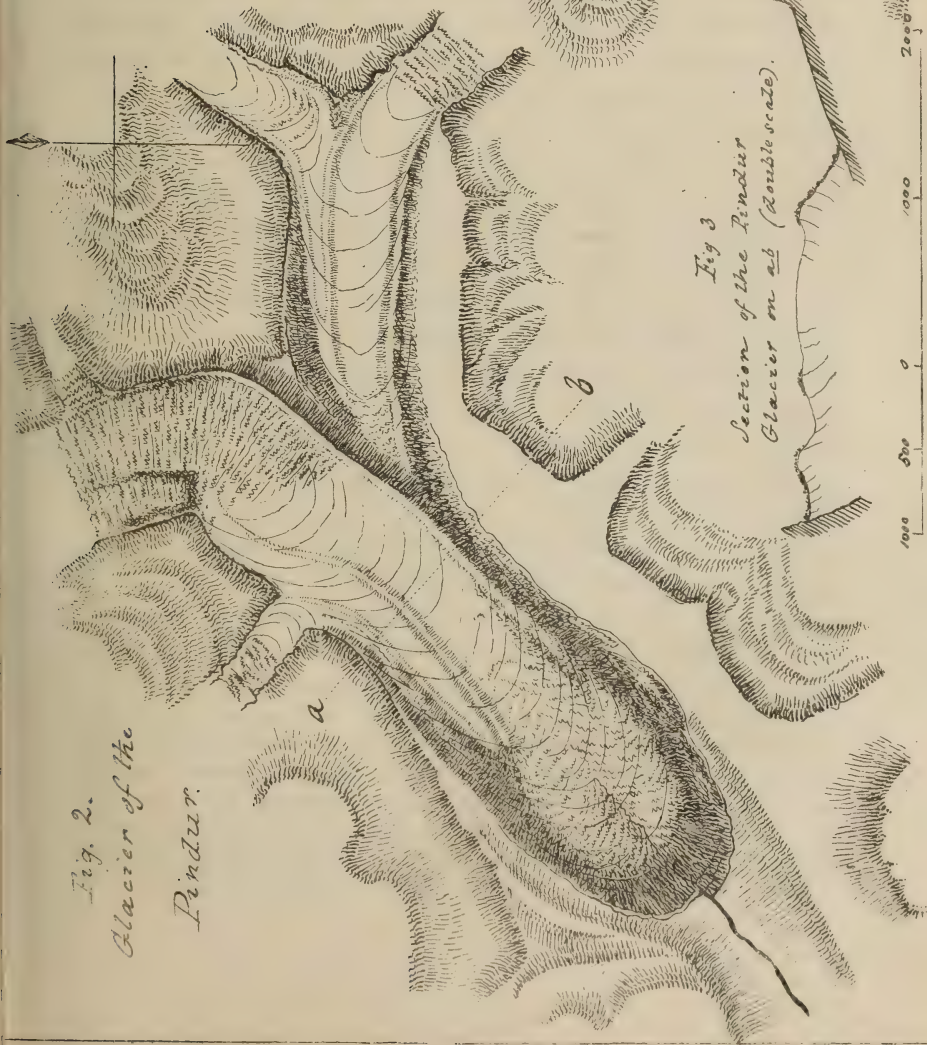


Fig. 2.  
Glacier of the  
Pindar.

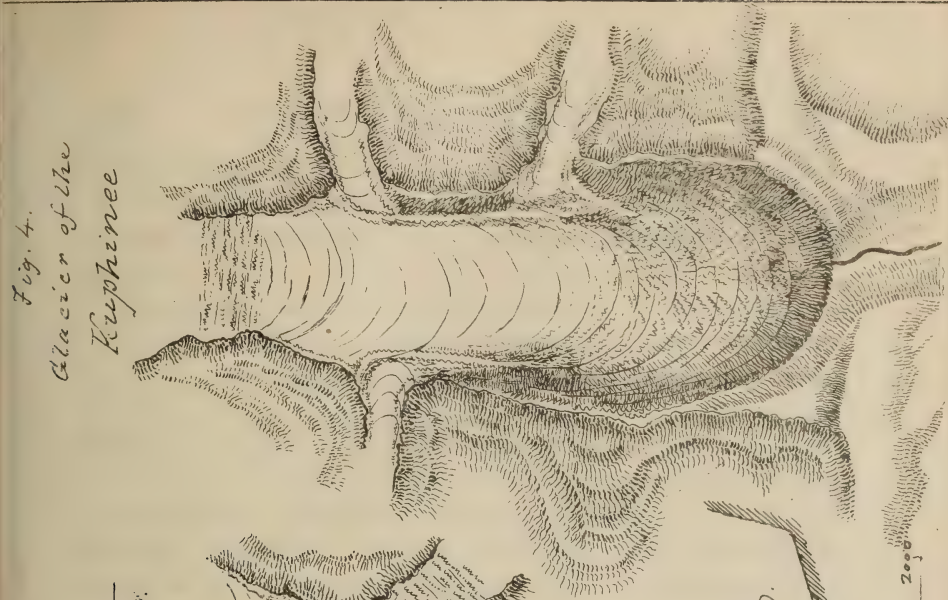


Fig. 3  
Section of the Pindar  
Glacier on ab (double scale).

1000 500 0 1000 2000  
Scale of yards.

Fig. 4.  
Glacier of the  
Kuphinee





latter evidently made by the separation of regularly stratified layers. The last thing that might be expected of such a dismal-colored and monotonously rounded hill, is that it should be composed within of the purest ice.

The cliffs that form the immediate bounds of the valley where the Glacier lies, are of no great height; but the mountains of which they are the foot, rise many thousand feet above them, though with much monotony of appearance. Many grassy slopes are still seen considerably above the Glacier; but bare rock and snow much predominate, and are soon left in sole possession of these inhospitable regions. Two peaks\* which rise, one to the N. East and the other to the N. West of the valley, probably to a height of 20,000 feet above the sea, are fine objects in themselves, and the frozen snow on their summits shines gloriously in the sun: but they are not sufficient to prevent the general impression from the scene being one of disagreeable monotony, and of desolation complete indeed, but without sublimity.

The Glacier is formed by the meeting of two ice streams, from gorges, one coming from the north-west and the other nearly from the east, which meet about 2 miles above the source of the river.

The feeder from the north-west is larger than that from the east, and its surface is at a considerably higher level, for some hundred yards below their first junction.—It descends with a great inclination, entirely filling the gorge down which it comes, in what Professor Forbes aptly terms a cascade of ice. It assumes the general appearance of a confused mass of irregular steps, which are again broken up transversely into peaks of every shape. The west side of this cascade continues nearly in its original direction, after having passed the point A, (see the sketch) below which the Glacier bends sharply to the S. W., and in this way completely crosses the Glacier. The steps in which it falls however also gradually change their direction, so as to

\* The peak on the N. West is the most easterly of the three smaller peaks, which are seen from Almorah below Nunda Devce. That on the N. East, is the point at the end of the range that descends from Nundakot to the North, and appears on its left from Almorah. Between these peaks is the pass called after Mr. Trail, over which he went into Joohar, or the valley of the Goree. It is perhaps rather gratuitous to call this passage a pass, as no one has gone over it since, and certainly never will go unless from curiosity. To the right of the N. E. peak is another depression in the range, over which, I was told Mr. Trail attempted to go but failed.

remain nearly perpendicular to the general current of ice. The transition to the regular level ice is very sudden, and begins much higher up on the west, than on the east side; the sudden change of direction in the Glacier round the point, A, evidently producing much the same sort of effect in breaking the current of ice and giving it a smooth surface, as would have been observed under similar circumstances in running water. Near the foot of this ice fall, (beyond which I did not ascend the Glacier,) the steps were observed to be in the form given in Fig. 5, having their tops considerably overhanging. A small tributary, also descending in cliffs of ice, joins the main Glacier from a ravine on its east side not far above the point A. Beyond it I was unable to see owing to the sudden bend in the glacier's direction.

The feeder from the east is formed by the union of two smaller Glaciers, one coming down from the N. E. the other from the S. E.; the latter is the larger of the two, and descends in ice cliffs to some little distance below the rocky point which intercepted my view of its upper parts. The N. E. tributary is not so steep, its surface as far as I could see being continuous, excepting immediately at its union with the other, where it seems to be a good deal broken up. I did not go on to any of these Glaciers, and describe them as they appeared from the upper parts of the united Glacier.

Another small tributary Glacier also falls into the main one from the N. W., a short distance below the point A. Its inclination is very great, but it perfectly maintains its continuity of structure to the bottom.

The lateral moraine of the west side of the northern branch of the glacier is first seen as it turns the point A, where it shows itself as a black band along the edge of the ice, which in other parts of the fall is quite white. The moraine is small between the points A and the tributary glacier below it; but from this it very rapidly increases, and in its lower parts is a chaos of desolation such as I never saw before. This great addition to the size of the moraine is owing to the quantity of debris brought down by the small glacier, over the lower parts of which stones were constantly rolling on to the upper end of the moraine during the whole time we were near it. We were thus here enabled to see the actual formation of a moraine. The ice below

the junction of this tributary with the main glacier being much broken up by crevasses ; rocks and gravel from the moraines on the two sides of the tributary are scattered over the space between them, and the moraines at first sight appear to lose their distinct form ; but although there is no clear ice between the moraine that originates on the east of the tributary, and the west side of the glacier, the identity of that moraine is sufficiently marked by its color, and by the regular rise above the general surface of the glacier, of its top, which remains tolerably even for some way down, being beyond the limit of the disturbance caused by the crevasses along the edge of the glacier ; about half way down to the lower end of the glacier however, the full action of these crevasses reaches the whole of the moraine, and it is scattered or lost sight of in the general confusion of surface.

An epoch of peculiar destructiveness to the mountains passed by the glacier is marked in one part of this moraine, by an accumulation of huge masses of rock from 20 to 30 feet square, and as much as 15 feet high, and the stones found on it, are generally larger than those on any of the other moraines ; the true west lateral moraine below the tributary glacier is not very large, nor is its top much elevated above the bottom of the valley, excepting quite at its end. This is probably owing to the level of the valley on this side being higher, (vide fig. 3,) rather than to the top of the glacier being lower. The bottom of the valley slopes from the cliffs at its sides, inwards. On the east, the edge of the glacier is at some distance from the cliff and the bottom of the valley has dipped considerably where it meets. The foot of the moraine, the summit of which on that side, is high above the valley. On the west side the glacier edge is close to the cliff ; the bottom of the valley will therefore be higher. I did not notice any difference of level in the two sides of the valley.

The lateral moraine of the S. E. side of the glacier is very large. Its top rises, on an average, probably 250 feet above the bottom of the valley. Along its foot runs a stream gradually increasing in size, that collects the drainage of the open part of the valley, and of the outer slopes of the moraine. The lower part of this slope is a mass of loose stones and earthy gravel, which rolls down from above, as the face of the ice, which is visible in the upper 50 or 60 feet of the slope, melts and recedes ; this process is seen constantly going on. On the



inner side, the top of the moraine is 30 or 40 feet above the level of the clear ice of the glacier.

The upper part of this moraine comes down nearly straight from the point B. The north branch glacier being, as was before noticed, considerably higher than the eastern, the moraine slopes down from the level of the former to that of the latter, forming a deep angular depression under the point B, (when it meets the foot of the north moraine of the east glacier;) that gradually diminishes in depth up to the top of this glacier, which is here entirely covered with debris, the moraines of its two sides being scattered all over it, for some distance above its union with the north or main branch. The appearance produced by this is that the northern branch runs over the eastern, or that the latter runs into the side of the former and is absorbed by it.

The eastern tributary brings down with it moraines which require no particular remark, beyond that already made, viz. that they spread over the whole of its breadth at its extremity.

Besides these lateral moraines, is a medial one, which, similar to several described by Professor Forbes, is first seen as a dirty stripe among the white ice cliffs of the fall at the head of the north glacier. As it comes down the level ice it gradually begins to assume the decided appearance of a moraine, and increasing by degrees at last becomes very large. It continues in a well defined form for some short distance beyond where the western moraine is dispersed; but there it also is scattered over the ice, and the two become blended together and ultimately extend to meet the debris which is similarly dispersed by the eastern moraine from the opposite side of the glacier.

The whole of the moraines in the middle of the length of the glacier, where it is most regular, are very considerably raised above the general surface of the ice, which in some parts is, I should think, as much as 100 feet below the tops of the western and medial moraines. It is not to be supposed that this great elevation is caused to any considerable extent by the mere mass of rocks and rubbish collected in the moraine; it results from the ice below the mass being protected by it from external melting influences, which constantly depress the level of the clear ice beyond the moraine. On the very tops of the moraines pure ice was often seen hardly covered by the stones.

The protection given to the ice by the great lateral moraines, raises

the sides of the glacier so much that a very considerable hollow is caused in its middle, which is a striking feature in the first appearance of its lower extremity.

The ice of which the glacier is composed agrees most exactly in its nature with the Alpine Glacier ice as described by Professor Forbes. It is perfectly pure and clear, but where seen in considerable masses stripes of a darker and lighter bluish green are distinctly visible. It is composed of bands of ice containing small air bubbles, alternating with others quite free from them. In many places the surface presents a striated appearance, arising from the different degrees of compactness of these differently colored bands, and their consequently different rates of melting.

The direction of these colored veins as seen in crevasses, or in the striated surfaces of the ice, follow laws exactly similar to those observed in the Alps. The dip was most distinctly inwards, i. e. towards the longitudinal axis, and upwards, i. e. towards the origin of the glacier, in every part; the stratification being more perpendicular near the head, and more nearly horizontal in the lower parts. The direction of the strata in plan, was also very clearly marked in many parts of the ice, and was plainly in curves, having their branches nearly parallel to the sides of the glacier, and their apices directed downwards; the curvature in the centre not being at all sudden. I no where could perceive "dirt bands."

The crevasses (perhaps owing to my visit having been made somewhat early in the summer) were much less numerous and terrific than I had expected. Although considerable detours were at times necessary in crossing them, I remember no place that I thought dangerous or difficult to pass. They are developed across the direction of the glacier's length along both of its sides, commencing from the small tributary on the west side, and from the union of the eastern glacier on the other;—and continuing almost to the end, those on the west being, I think the largest. They are generally wider towards the edges of the glacier, closing up as they approach the centre. They are nearly vertical, and are directed from the sides upwards, or towards the head of the glacier, those on the west bearing nearly E. and W., those on the east bearing nearly N. and S., thus forming angles of about  $45^{\circ}$  with the axis of the glacier.

Many pools of water (the Baignoires of the Alps) were seen on the surface of the ice ; some of the largest were said by our guides, who are in the habit of visiting the glacier, to be found in the same place every year. The clear surface of the ice everywhere assumes a more or less undulating form, from the action of the water that drains from it as it melts ; and the small streams, into which the drainage collects, end, as in the glacier of the Alps, by falling into some of the crevasses. The remains of the last winter's snow was hardly perceptible on any part of the glacier.

The occurrence of stones standing up on bases of ice (Glacier Tables) above the general surface of the glacier, is common, but all that I saw were small. I also observed what appeared to be imperfect glacier cones, or the remains of them, but these also were small.

The ice of the glacier coming into direct contact with the cliff below the point A, I was enabled to examine the effect produced upon the rocks ; I found it covered with grooves or scratches, sloping in about the same direction as the surface of the ice at the spot. These grooves extend to 20 or 30 feet above the present level of the glacier. I also observed, that almost everywhere a space was left between the rock and ice, the latter appearing to shrink from contact with the former. This was of course the effect of the heat of the rock melting the ice. I regret that an attempt that I made to measure the actual motion of this glacier proved ineffectual, owing to circumstances which it is not necessary to detail.

The valley of the Kuphinee, for a mile or two below the end of the glacier, has much the same general character as that of the Pindur, but is more rugged and desolate in appearance. A fine peak of pure snow (probably Nunda Kot, or No.15) is seen from below the glacier, but is lost sight of behind an intermediate point, on a nearer approach.

The direction of the glacier (fig. 4) is almost due N. and South, and the whole breadth of the valley, in its upper part, about  $\frac{3}{4}$  mile, is occupied by it. It commences about 2 miles above the river source, in a very precipitous fall of ice. We went up about 200 feet of the lower part of this, much beyond which it would probably have been impossible to ascend owing to the excessive steepness alone. A cliff of ice about 60 feet or 70 feet high rose immediately above the point which we reached. The ice was perfect, with the ribbon structure quite visible ; the bands



were very highly inclined, and I think farther apart than in the lower parts of the glacier. The direction of the structural lines was in no degree parallel to the sides of the glacier, but much more nearly perpendicular to them. The precise contrary of this was observed by Professor Forbes under apparently similar circumstances, in the glacier du Taléfre in the Alps.

From the foot of the fall, the surface of the glacier was on the whole very even, though its slope downwards was very considerable. It still had remaining on its upper half a good deal of unmelted snow, which was disagreeable to walk over, as it was seldom strong enough to make us indifferent to what was under it.

The main glacier is joined by two small tributaries on the east, and by one on the west; all are highly inclined and bring down considerable quantities of debris. The moraines are altogether confined to the sides of the glacier, though many small stones are scattered over every part of the ice. Here, as in the glacier of the Pindur, the protection given by the moraines to the ice on the sides raises them greatly, and leaves a deep hollow in the middle of the glacier at its end. The crevasses here also are most strongly marked near the sides, and are inclined at an angle of about  $45^{\circ}$  from the longitudinal axis, downwards. The structure of the ice is in all respects precisely as was seen in the Pindur Glacier. I am unable to offer any decided opinion as to whether these glaciers have ever varied considerably from their present limits. During the very short period of my visit to these regions, I saw no direct evidence of it. The shepherds who take their flocks to the pastures in the valleys near the glaciers during the summer months, (for there are no fixed habitations within 14 or 15 miles of them,) have no idea of any motion in the glacier, but say that they suppose the ends of them to be gradually receding. Their statements are however of a very vague nature, and as far as I could judge, are founded on their views of what ought to be rather than of what really is. Some very decided change in the state of things is however certainly indicated by the long plateaus, which I before mentioned, running for a mile or two below the present terminations of both glaciers, nearly parallel to the rivers, but several hundred feet above them. I consider it to be impossible, that these level banks above the rivers have been caused by deposits from the ravines in the sides of the



valleys, for such deposits would have had very irregular surfaces; and indeed their present effect in *destroying* the regularity of the plateaus is every where visible. Had the same appearance been noticed in any other part of the river's course, it would at once have been attributed to the action of the water at some former period; and it would have been supposed, that the bed had afterwards been excavated to its present depth. If this was the case, the glaciers while the plateau was forming, must either have terminated considerably higher up the valleys, or have stood altogether at a much higher level; in either of these ways the water could have been delivered at a level sufficiently high to form the plateau. But it may admit of doubt, whether the quantity of water in the rivers, as they are at present, is sufficient to account for such an extent of level deposit, or for such a depth of erosion of their beds; for at this great elevation they are not subject to those violent floods that occur lower down; for nearly half the year too they must be almost inert.

The only other way that occurs to me of accounting for the appearance, is that it has been occasioned by an *extension* of the glacier, and that the level top of the plateau shows the limit to which the tops of the moraines reached, as the glacier gradually receded. From the very cursory nature of my examination of the matter however I am unable to do more than point out the fact, and what possibly may have caused it.

There is another circumstance relating to these rivers which is also worthy of notice, namely, that in the upper 2 or 3 miles of their course their fall is considerably less than in the 2 or 3 miles immediately succeeding those. Thus in the Kuphinee, the average fall in the first 3 miles is about 400 feet, in the next 4 miles about 650 feet per mile; but as the average is only about 160 feet for the next 8 miles, it is highly probable that the fall in the 4th and 5th miles will be considerably greater than in the 6th and 7th. I therefore infer that it is quite possible that the fall in the 4th and 5th miles may be as much as 800 feet per mile, or even more; which the appearance of the rivers would fully justify.

Smaller extensions of the glacier of the Pindur were visible in many places. They were marked by mounds of a rounded form, covered with grass, projecting from the modern moraines in a curved direction concave to the glacier. I did not remark them at the Kuphinee.

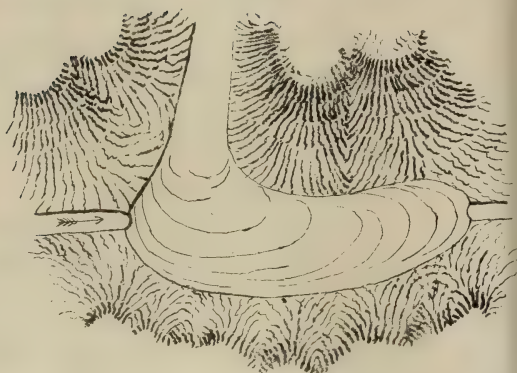


fig 5



Section of ice-cliffs at head of Pindur Glacier

fig 6



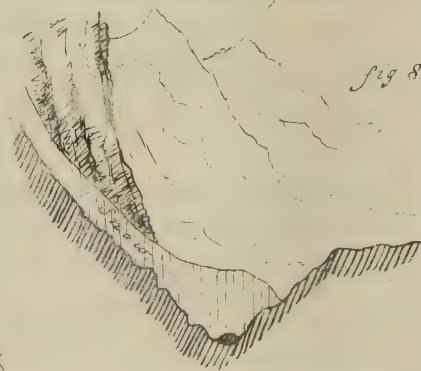
Snow bed - plan

fig 7



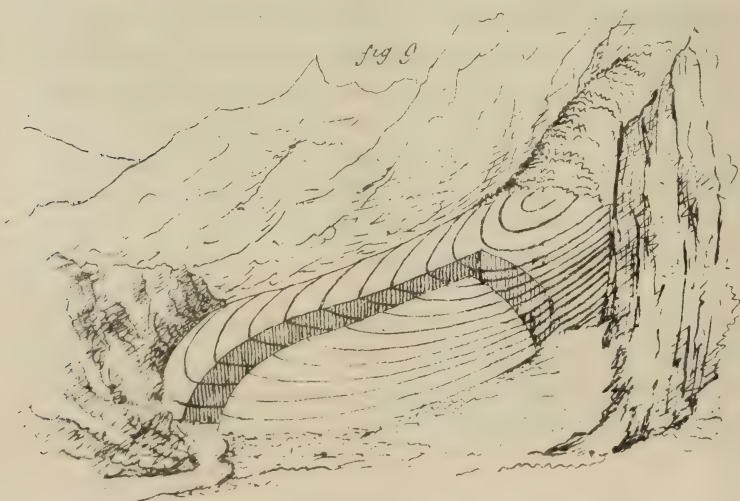
Snow bed - longitudinal section.

fig 8



Snow bed - transverse section

fig 9



Imaginary sections of a Glacier.

I would here observe, that in this climate, where we are subject to periodical rains, persons should be cautious in concluding that piles of rocks in long lines are moraines, even though their edges are in no way water-worn. On both of these rivers I saw many instances of such heaps of rocks, which might very easily have been thought moraines; and though from their immense extent, and the great size of the blocks they contain it is not easy to believe that they have been formed by the action of water, more particularly as the rocks have perfectly sharp edges and as there is often no appearance of water ever having been near them; yet they have certainly been brought down by torrents and may be easily traced up to ravines in the mountains.

The term snow-bed having been hitherto applied by travellers in these mountains, (with one exception†) both to true glaciers, and to mere beds of unaltered snow. I will shortly explain what is meant by it when used in the latter, which is the correct sense. In many parts of the higher valleys, real beds of snow lie far below the limit of perpetual snow for the greater part of the year, and some would probably be permanent at very low elevations were they not destroyed by the rain during the rainy season. These snow beds are formed by avalanches, as is sufficiently proved by their form and position. Figs. 6, 7 and 8, represents one on the Kuphinee river, which occurs at an elevation of about 10,800 feet.

It came down from a ravine, and entirely covered the river which flowed under its whole length. The snow extended but little beyond the upper side of the ravine, but was prolonged far down the river on the lower side. Its surface was marked by curved hills, as is shown in the sketch. This is evidently precisely the form that would be assumed by snow falling down the ravine into the river. The slope of the river bed being great, the avalanche would naturally continue its course down it, after having filled the channel immediately in front of the ravine. The fall of an avalanche in the upper part of this valley gave me an opportunity of seeing the motion of loose snow in large masses; it was very similar to that of a fluid body, the snow appeared rather to flow than to fall. So here, the snow descending through the ravine, gradually filled the river channel; the main supply moving with the greatest

\* I allude to Major Madden, who has given a short account of the glacier of the Pindur in a late number (176) of this Journal.



velocity down the middle, but sending off, all along it as it went on, particles to the sides. Its head would therefore advance in a convex curve, as the central particles moving directly forward, would always keep in advance of those that spread out to the sides. The end of the snow bed thus takes the curved form shown in the figure, and a succession of smaller avalanches, would mark its surface with numerous curves of the same sort.

In the last two miles of the approach to the Kuphinee glacier, we crossed two snow-beds, both of which were upwards of  $\frac{1}{4}$  of a mile wide, and extended from the ravines in which they originated, right across the valley from side to side, entirely covering up the river.

The surface of many of the snow-beds has a sort of rippled appearance, caused by the protection given by grass and leaves blown upon the snow to the parts immediately under them. The snow itself is generally firm, and receives but a slight impression from the foot of a man walking over it.

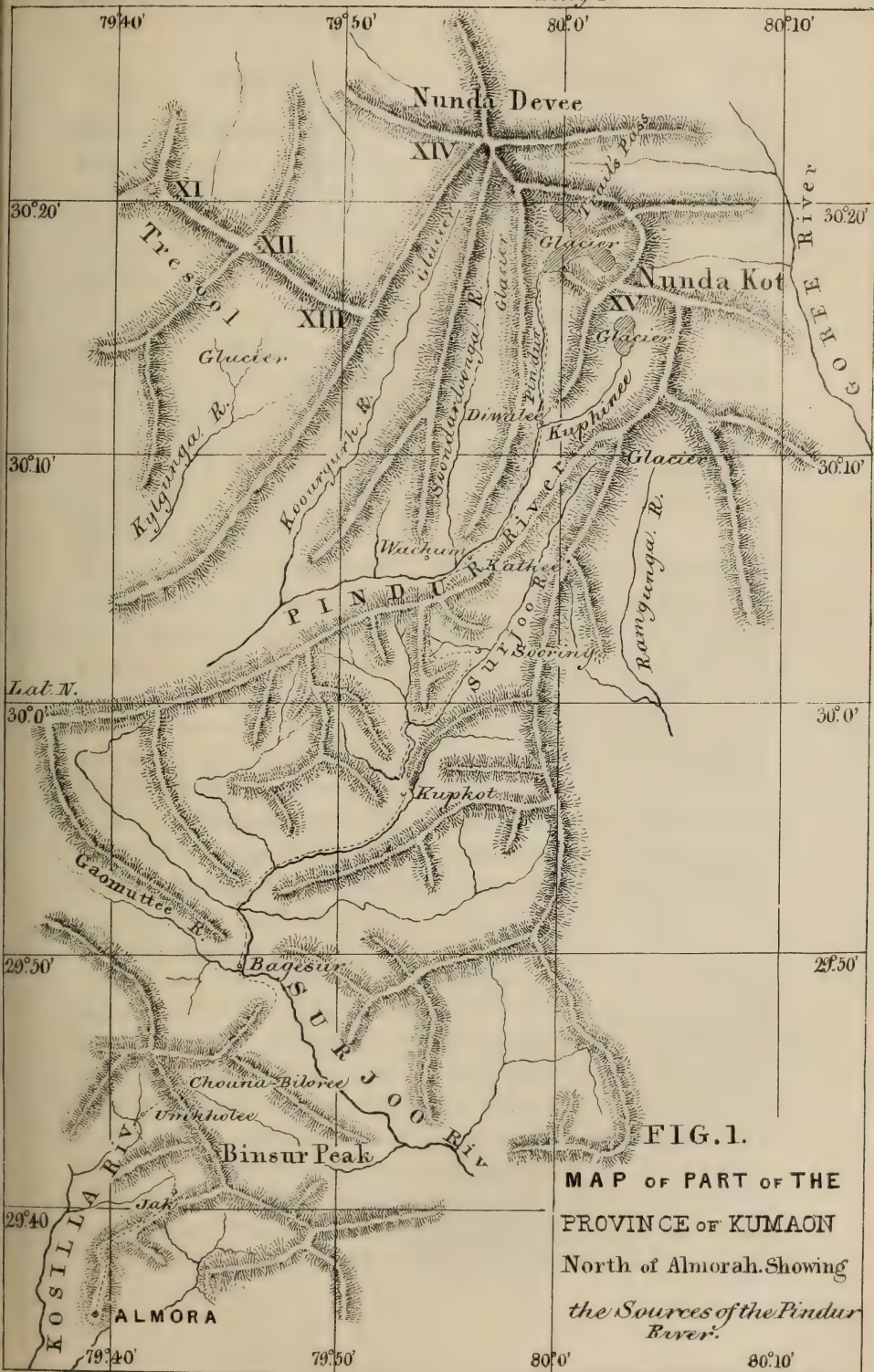
I have estimated the heights of these glaciers from observations of the boiling point of water as follows; the results will certainly be within 500 feet of the truth.

Ft. above the sea.

|                                                                              |        |
|------------------------------------------------------------------------------|--------|
| Lowest point of the glacier of the Pindur and source of the river            | 11,300 |
| Surface of the glacier at the commencement of smooth ice...                  | 12,000 |
| Lowest point of the glacier of the Kuphinee and source of<br>the river ..... | 12,000 |
| Surface of the glacier at the commencement of smooth ice ...                 | 13,500 |
| Diwalee, union of the Pindur and Kuphinee .....                              | 8,200  |

The limit of perpetual snow here being about 15,000 feet above the sea, in the one case the glacier comes down 3700, and in the other 3000 feet below it. At the Kuphinee glacier, a mass of *Rhododendron companulatum*, a shrub 6 or 8 feet high, was growing within 30 yards of the ice. There were no shrubs of any size at the Pindur glacier, but grass and flowers were at both places flourishing considerably above the level of the ice.

Having now concluded the record of my own observations on the two glaciers seen by myself, I will add two extracts from the Journals of travellers in these mountains, which most clearly prove the existence of two other glaciers, both of great size, one at the source of the Bha-







giruttee or Ganges, the other at that of the Goree, which is one of the main feeders of the Kalee or Gogra. The first extract is from a journal, by Capt. Hodgson, of a visit to the source of the Ganges, in the year 1817. (*Asiatic Researches*, No. XIV. Qu. pp. 117—128. Capt. Hodgson thus describes the first appearance of the glacier from which the rivers rises.

“The Bhagiruttee or Ganges issues from under a very low arch at the foot of the grand snow-bed,”—“over the debouche the mass of snow is perfectly perpendicular, and from the bed of the stream to the summit we estimate the thickness at little less than 300 feet of solid frozen snow, probably the accumulation of ages;—it is in layers of some feet thick, each seemingly the remains of a fall of a separate year. The height of the arch of snow is only sufficient to let the stream flow under it.”

He ascends the glacier—“This vast collection of snow is about  $1\frac{1}{2}$  miles in width, filling up the whole space between the feet of the peaks to the right and left; we can see its surface forward to the extent of 4 or 5 miles or more”—“general acclivity  $7^{\circ}$ , but we pass small hollows in the snow caused by its irregular subsiding; a very dangerous place, the snow stuck full of rubbish and rocks imbedded in it. Many rents in the snow appear to have been recently made, their sides shrinking and falling in.” “Ponds of water form in the bottom of these.”

“It was remarked above, that the snow of the great bed was stuck, as it were, with rock and rubbish, in such a manner, as that the stones and large pieces of rock are supported in the snow and sink as it sinks; as they are at such a distance from the peaks as to preclude the idea that they could have rolled down to their present places, except their sharp points had been covered, it appears most likely” that they came down like snow balls with avalanches. “It is not easy to account for the deep rents which intersect this snow-bed, without supposing it to be full of hollow places.” The source of the Ganges is stated by Capt. Hodgson to be 12,914 feet above the sea.

The next is an extract from a journal of Lieut. Weller, printed as a note to a journal of Capt. Manson’s, *Journal Asiatic Society*, No. 132.

“I went to see the source of the Goree river, about a mile N. W. from Milum. The river comes out in a small but impetuous stream, at the foot of apparently a mass of dirt and gravel some 300 feet high,



shaped like a half moon. This is in reality a mass of dark-colored ice (bottle-green color), extending westward to a great distance, and covered with stones and fragments of rock, which in fact form a succession of small hills. I went along this scene of desolation for a long space, but could not nearly reach the end. Here and there where circular and irregularly shaped craters (as it were) from 50 to 500 feet in diameter at top, and some of them 150 feet deep. The ice was frequently visible on the sides, and at the bottom was a dirty sea-green-colored pool of water, apparently very deep. The bases of the hills on either side, and frequently far up their faces, are one succession of landslips; but from their distance, I do not believe it possible that the debris in the centre of the snow-bed valley, can have fallen there from the side hills." Lieut. Weller also says of the same glacier in his journal published in the *Journal Asiatic Society*, No. 134:—"The mass of desolation, as described at the source of the Goree, continues thus far up—that is about 4 miles, and how much farther no one will or can tell me. The fissures hereabouts are narrow, instead of being crater-like, and the ice when visible is more nearly the color of snow. On the opposite (south) side, huge accumulations of ice and gravel are to be seen in the openings between the hills;—once on either side, I had a view of the old ice high upon the hills; its light sea-green color, with strongly defined and fantastical lines of shape (castles, stairs, &c.) formed a very pleasing and grand appearance." This glacier is known to be 6 or 7 miles long; its lower extremity is at 11,600 feet above the sea.

In the published journals of travellers in the Himalaya, that I have seen, I have not met with any other accounts of glaciers sufficiently distinct to be worth quoting, though we not unfrequently come across a snow-bed that seems suspicious. I am however fully satisfied of the *actual existence* of many other glaciers, both from the verbal accounts of Mr. Batten, who has been a resident in Kumaon for many years, of my brother, Mr. H. Strachey, who visited several of the passes into Tibet last year, and of the Bhotias (the natives of the valleys immediately below the snowy ranges), and from having myself had distant views of several.

From these sources I am able to affirm positively, the existence of glaciers at the heads of the following rivers;—viz., the Vishnoogunga (near Budrinath); the Kylgunga, the Koourgurh, the Soondurdoonga,

all rising from the southern side of Tresool and Nunda Devee ; the Ramgunga (that which falls into the Surjoo, not the great river of the same name) ; the Piltee, an affluent of the Goree ; and the Gonka which rises near the Oonta-doorra or Joochar pass into Tibet.

I therefore conclude, that in the Himalaya, as in the Alps, almost every valley that descends from the ranges covered with perpetual snow, has at its head a true glacier ; and in spite of M. Elie de Beaumont's ingenious fact, that the seasons here " have no considerable variations of temperature," and that " the thaw and frost do not separately penetrate far enough to convert the snow into ice ;" I am of opinion, that the very great intensity of all atmospheric influences, including variations of temperature, should render these mountains one of the most favorable fields for the investigation of glacial phenomena.

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## APPENDIX.

*A short account of the principal Phenomena of Glaciers, abstracted from chapters 2, 8 and 21 of Professor Forbes' Travels through the Alps of Savoy, &c.*

*Perpetual Snow.*—The atmosphere becoming colder as we ascend in it, the tops of mountains that are more than a certain height above the level of the sea, are always covered with snow ;—this height is greatest at the equator, where it is about 16,000 feet, and gradually diminishes towards the poles, where the natural covering of the earth is ice and snow.

*Snow Line.*—The snow line is an imaginary line passing through those places, at which the snow which falls in one complete revolution of the seasons, is just melted in that time, and no more.

*Glaciers.*—The common form of a glacier is a mass of ice, that extends from the region of perpetual snow, into the lower valleys, which are clothed with vegetation ; and that sometimes even reaches to the borders of cultivation. The snow line on the glacier, is somewhat lower than on neighboring parts of the mountains ; but below it, the snow is melted and disappears from the surface of the ice, as regularly and entirely, as from that of the country into which the glacier descends.

*Motion.*—The existence of the glacier in such comparatively warm situations, can only be accounted for by supposing, that its daily waste is supplied by its daily descent, and that its terminal face which appears unmoveable is in fact perpetually changing. Therefore when the total waste exceeds the total motion the glacier appears to recede up the valley; when the converse happens, the end of the glacier advances; when the two are exactly the same it remains in the same position.

*Rivers rising from Glaciers.*—The waste of the glacier from the action of the sun and rain, gives rise to a stream of turbid water, which issues from the extremity of the ice, out of a cave.

*General form of glaciers.*—Glaciers vary in their dimensions, up to 3 miles in width and 12 in length. The lower portion is usually very steep; the middle has only a moderate slope; the upper again is more inclined. The sides when exposed are also very steep. The surface is more or less undulating, the irregularities in a great measure arising from the action of the water, that collects from the surface drainage, and forms streams of considerable size.

*Crevasses.*—The ice is considerably broken up, by fissures or rents, called crevasses; these are usually vertical in their direction, and of widths varying from a few inches to many feet, sometimes extending almost from side to side of the glacier.

*Moraines.*—The rocks and debris, that fall upon the ice from the cliffs that usually bound the glacier, instead of accumulating where they fall, as they would do if the ice were stationary, are carried *down* as it advances, and form continued lines along the sides of the glacier. Their stony borders are called moraines.

*Lateral Moraines.*—Those moraines that are formed on the sides of the glacier, as just described, are called lateral moraines.

*Medial Moraines.*—When two glaciers from different sources meet, the inner moraines of the two unite, and continue to move on together down the compound glacier, which but for this mark would at a short distance below the point of union be undistinguishable from a simple one. Such a moraine, having clear ice on both sides of it is said to be a medial moraine.

*Elevation of Moraines.*—From the protection given to the ice below by the rocks of the moraine, it appears to rise gradually above the general surface of the glacier, which on the other hand is constantly



being depressed by the action of sun and rain, while the protected parts of the ice remains unmelted. The moraine is not a mound of debris, as it appears at first sight, but an icy ridge, covered with rocks, sometimes with a breadth of some hundreds of feet, and raised from 50 to 80 feet above the general level of the ice.

*Glacier Tables.*—Single blocks of stone lying on the ice, appear from the same cause to raise themselves above the surrounding surface, upon pedestals of ice ;—these are called glacier tables.

*Glacier Cones.*—An accumulation of sand which sometimes forms in holes in the ice, in like manner protects the surface beneath it, and by a curious inversion of its shape forms a pyramid or glacier cone, sometimes 20 or 30 feet high and 80 or 100 feet in circumference.

*Baignoirs.*—An operation strangely converse of this takes place, when a small cavity forms in the ice, and becomes filled with water, but with no considerable quantity of debritus. Water just freezing is *lighter* than water at a temperature somewhat higher ; the water at 32° therefore floats on the surface of the other. When therefore the surface of the water in the pool becomes heated by the sun's rays a little above 32°, it immediately sinks, and by communicating its extra heat to the bottom of the cavity, melts and deepens it, and being cooled, is ready to rise again to the surface in its turn.

*Structure of ice.*—The ice of which a glacier is composed, consists of bands or laminæ of blue compact ice, alternating with others of a lighter color, not less perfect but filled with countless air bubbles. This peculiar structure gives to a glacier all its extreme brittleness. The difference of hardness of the strata, causes the surface of the glacier in many parts to appear striated with fine lines, and when groups of harder bands occur, there are projecting ridges with grooves between them, much resembling ruts in a muddy road.

*Direction of structural planes.*—The direction of the bands or veins is explained in fig. 9, which shows an imaginary section of a glacier. The strata of ice lie like a succession of shells one within the other.

*Cause of veined structure.*—The *origin* of the veined structure, seems not be altogether satisfactorily explained ; but the *direction of the veins*, and the *form of the structural surfaces*, is well accounted for by Professor Forbes, as the effect of the different velocities of the different parts of the ice, which as in running water is greatest in the centre



and at the surface where the friction is least, and vice versâ. To enter more fully on this matter is beyond my proposed object.

*Névé*.—That part of the glacier above the line of perpetual snow, is called the *névé*. It is composed of granular snow alternating with bands of ice and has the appearance of being regularly stratified in beds parallel to its surface. The passage of *névé* into true glacier ice, is also a point not satisfactorily explained.

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*Zur Litteratur und Geschichte des Weda. Drei Abhandlungen von Rudolph Roth, Doctor der Philosophie. Stuttgart, 1846. (On the Literature and History of the Veda. Three Treatises, by Rudolph Roth, Ph. Dr., Stuttgart, 1846.)*

(Translated by J. MUIR. Esq. C. S.)

This little book, containing as it evidently does the results of profound and accurate research, is a valuable addition to our knowledge of the structure and contents of the several Vedas, and of the interpretative literature to which these ancient books gave rise. Some account of the brochure will, it appears to me, be acceptable to the Society, at the time when it has just undertaken the publication of the whole text of the Vedic hymns. Dr. Roth's book consists of three treatises; the first entitled "The Hymn Collections," extends, with excursuses and remarks, from pp. 1 to 52. The second is headed "The oldest Vedic Grammar, or the *Prâtisâkhya Sûtras*, pp. 53—86. The third (pp. 87—144) bears the title "Historical matter in the Rig Veda; Vasishthâ's contest with Viswamitra." The contents of the first treatise will be fully learnt from the following translation of it entire, with one of the notes, which I hope may be considered admissible into the pages of the Society's Journal. The second treatise enters into detail in regard to the *Prâtisâkhya Sûtras*, of which some account has previously been given in the first. The third quotes and translates some hymns from the Rig Veda, which contain traces of a conflict between the rival priestly houses of Vasishtha and Viswamitra, and record the names and wars of a number of petty tribes who at that early period occupied the Punjab. The whole of Dr. Roth's book,

which extends to 144 pp. only, is well worth translating, and I trust this may be undertaken under the Society's auspices. It should prove interesting not only to the general student of Indian antiquity, but still more so to that enquiring class of Hindu youth, who, with as yet but imperfect appliances, and under incompetent guides, have been directing their attention, though but uncritically, to the earlier doctrines of their religion.

Dr. Roth appears to have spent some time at Paris, London and Oxford in the examination and study of the MSS. connected with his researches. The short treatises under review are only, it is to be hoped, the first fruits of his studies. In his dedication to Professor Wilson, and in his first treatise, he alludes to his intention to publish the *Nirukta*. He appears to have a further work in view, but speaks doubtingly of the prospects of its completion, in these words: "The labour, however, which I propose to myself as the compensating fruit of these exertions, an Archæology and Mythology of the Veda, is, for the present, rather a wish than a possibility."

Dr. Roth himself however is not the only new labourer whom we have to welcome to this field of exertion. In a note at p. 22, he mentions his friend Dr. C. Rieu of Geneva, as having under preparation an edition of the *Aitareya Brâhmana*. In p. 25 he mentions Dr. Trithen in London as engaged in the same studies. At page 4 allusion is made to an edition of the *Sanhitâ* of the *Sâmaveda*, promised by Dr. Theodore Benfey, who has already published an article on India in *Ersch and Gruber's German Cyclopædia*, which is referred to with indications of approbation by M. Burnouf, in his introduction à l'histoire du *Buddhisme Indian*, *passim*. Allusion is made by Dr. Roth at the close of his first lecture to the edition of the *Rigveda* which Professor Wilson has in preparation. It does not appear, however, when this important work is to be looked for.

#### I.—THE HYMN COLLECTIONS.

*Delivered at the meeting of Orientalists at Darmstadt, at the sitting of 2d October, 1845.*

You have permitted me, Gentlemen, to speak on a branch of Indian literature which, if any can, asserts a claim to general interest, and the cultivation of which demands the union of various powers, but

which will at the same time yield the richest spoils,—the literature of the Veda. You will allow me, in order to make room in some measure for this extensive subject, to regard as known all which has hitherto been written or published on the Veda. Of this there is so little, and that little has been so much the subject of remark, that it is sufficiently known in all Oriental circles.

It has been the peculiar fate of the Veda that being at first veiled or magnified into the extravagant by Bráhmancial mystification and ostentation,—the effects of which have not yet disappeared,—it presented a terrifying complication of writings, with which no one trusted himself to meddle. When H. T. Colebrooke had at length brought light into the darkness, still the importance of these books in part escaped him ; and Frederick Rosen, who formed a right estimate of it, and was the man to render the discovery fruitful, was only permitted to rear himself a beautiful monument, to make a commencement, which makes us the more severely miss the continuation, in proportion to the certainty that the latter would, through the writer's growing experience, have gained a perfect form. No other was willing to tread in his footsteps ; and so Rosen's book, and Colebrooke's, in its way, excellent treatise, are still the only mines for our knowledge of the Veda. I can scarcely mention what has been done by the Missionary Stevenson for the Sáma Veda : for his edition of the text is less correct than any tolerable MS., and his translation is utterly useless.

Let me be permitted here to supply to Colebrooke's treatise those complements, which I have had the opportunity of drawing from an inspection of the MS. sources in Paris, London, and Oxford,—complements which will refer to the relation of the first Veda to the remaining collections of hymns, and to its Indian compilation, and which,—so far as our researches must be based upon indigenous preparatory labours also,—could be communicated in no more fitting quarter than in a learned circle which has set itself for its task the investigation of the East. For according to my conviction no more essential service could be rendered to the history of the ancient east, perhaps to the whole of ancient history, than to make known and exactly investigate the Vedic writings.

The well-known definition of the difference between Mantra and Bráhmāna,—which is found in all possible writings explanatory of the



Veda, and is amply handled in the *Mimánsa*, and according to which the Mantra is commonly metrical and an invocation, while the *Bráhmaṇa* is mostly prose, and consists of practical religious precepts,—this definition denotes also the fundamental division of the Vedic books. They sever themselves into collections of hymns, and liturgical works. That the former, not only in their origin but also in their collection, are more ancient than the latter, so long as no proofs appear to the contrary (and I have been able to find none) we may, I believe, regard as settled.

But among the five Vedic books which are called *Sanhitá*, there are only four hymn-collections. The fifth, the *Taittiriya Sanhitá*, which is regarded as a principal part of the *Yujur Veda*, is a liturgical book, which may occupy the same place in respect of this Veda, as the *Aitareya Bráhmaṇa* fills for the *Rig Veda*. (It is also called *Taittiréya Bráhmaṇa*).

Among these four collections of hymns that of the *Rik* has the most considerable compass; and may amount in all to near eleven thousand verses. The *Atharva* hymns are nearly as numerous. The *Vájasaneyá Sanhitá* (of the *Yajur Veda*) may amount to half the extent of the *Atharva*, and the *Sáma Sanhitá* to half the *Vájasaneyá*. Hence would result for the four collections united the number of about 30,000 distichs.

Colebrooke has remarked here and there in his treatises that whole hymns, strophes, or single verses of one Veda are again found in another, or in all the rest, without however giving any more exact determination of the matter. But it appears to me important to be able to estimate the total extent of the old poems which have come down to us in the Vedas, and their distribution in the single collections, for from this point the first step must be taken towards a determination of the reciprocal relation of the different Vedas. The information I can supply on this point is as follows :—

The *Sanhitá* of the *Sáma Veda* is, according to the testimony of the Indian commentators, (e. g. of *Sáyana*, in the introduction to his explanation of the *Rik*,) completely contained in the first Veda (the *Rik*), i. e. the single verses of the *Sáma*, are repeated in the connexion of the hymns of the *Rik*. Some very rare exceptions of verses, however, occur, which the *Rik* does not contain. The references to particulars



will be fully given in Dr. T. H. Benfey's edition of this *Sanhitá*, for which we are now looking.

The *Vájasanéya Sanhitá* of the Yajush, on the contrary, embraces a number of sections which are peculiar to it. From an inspection of several parts of this book, for which however I had but slender assistance from commentaries or similar works, it appears to me that perhaps the half of the whole recurs in the *Rik*. The other half consists in great part of sacrificial formulas, e. g. the *Swáhá* repeated hundreds of times, and perhaps only a fourth of the whole consists of fragments of songs or invocations in prose, peculiar to this collection.

It is more difficult for me to give similar specifications in regard to the *Atharva*, for as we generally see it treated in a step-mother-like fashion so has it also found no commentator, and the only assistance which I have been able to obtain is a carelessly-made copy of the *Anukramaní* of this *Veda*, which pays much more attention to the metres of the single verses, than to other points of information. Excepting the names of gods, I find only *Atharva*, and *Bhrigu Angiras* named as *Rishis*, or composers of hymns, though not only strophes but whole hymns of from 30 to 40 verses, which in the *Rik* have their author specified, are received into the *Atharva*. It is however easy to perceive that this *Veda* contains far more pieces peculiar to itself, than the *Vájasanéya*, and that what is common to it, with the *Rik Sanhitá* is limited to perhaps a third part of its extent.

The important question which must connect itself with this determination of the external relation of the four collections of hymns, is this : has each of the *Sanhitás* an independent origin of its own? are they in part borrowed from each other? or finally, is one of them,—and it could be no other than the *Rik*,—to be regarded as the source of the rest? A sufficient answer to these questions will of course be only *then* possible, when we shall have in detail before us not only the contents of each *Veda*, but also the variations in the several texts, which in many cases, are very material. A general representation may however even now be derived from the difference in the arrangement which is followed in these collections, and I may therefore be permitted to enter further into this point.

In reference to the use of the *Rig Veda*, we must not allow ourselves to be deceived by the arrangement of the MSS. as they now lie before

us without exception. The division which they present is notoriously a mere external, uniform separation into eight parts (Ashtaka), next of these into eight sub-divisions (Adhyāya, lectures,) and lastly into sections (Varga) of five verses each. We might from this believe that we had before us an unarranged aggregate of songs, distributed in this manner only on account of an external point of coherence. But along with this division there exists an entirely different one, as we now know it principally from Sāyanā's commentary. This arrangement has for its largest section the Mandala, (circle, book,) within that the Anuvāka, (chapter,) with a number of hymns, (śūkta,) which again are parted into their distichs (rich.)

This division into ten Mandalas is beyond all doubt the original one, fixed by the collector of these hymns as it has come down to us. Hymns which were ascribed by tradition to the same author or the same family, or hymns which belong to the like sacrificial ceremony, as the Soma-hymns of the 9th Mandala, are here united in one section, without regard to their outward extent.

The first mentioned division (into Ashtakas) on the contrary appears to have its ground in the need of sections of uniform size for the use of the Veda in the schools. In the 15th section of the Prātisākhya Sūtras ascribed to Saunaka, there is found a collection of rules for the reading of the Veda in teaching, which appear to have reference to this point. The teacher recited two or three distichs, according to the length or shortness of the aggregates of verses (hymns), which were repeated by the scholars in order. One such portion is called prasna (question,) and sixty or more of these, says the Sūtra, i. e. about one hundred and fifty verses, compose an Adhyāya, a lesson of the Veda, which is at the same time the quantity actually read in the school.

Besides that it would be absurd, where a real division of the matter exists, to regard one which is merely formal as the original one, we have the proof for the greater antiquity of the Mandala-division in the modes of speech employed by the oldest interpreter of the Veda. The Nirukta names the Rig Veda in several places, and always with the designation Dasatayya, the ten parts. The same mode of designation is found in the Prātisākhya Sūtras, which are older than the Nirukta, in the commentary on the latter, and in a number of other books. The Anukramanikā of the Rik also has this division, although in the

MSS. it is externally separated into Ashtakas. Hence it results that it would be unnatural to make any other division than that into ten Mandalas the basis of a future edition of this Sanhitá.\* For in whatever way criticism may decide in detail on the historical value of the tradition touching the authors of the Vedic hymns, still this tradition has been held authoritative by the collector and by the oldest interpreters of the Veda, and it may moreover be proved from the affinity of the representations and of the language that, in the present recension of the Veda, those sets of hymns are mostly arranged together, which must have had a common origin, and possibly may have been previously united in particular collections.

In the Mandala itself again there exists an arrangement. It may in most cases be shown why the hymns are given in this determined sequence. That a regard to their ritual import had its effect, is evident, but it was allied with the main principle of each division, viz. to place together what was homogeneous. Hymns addressed to Agni follow each other, and generally occupy the first place in the several books, then the hymns to Indra, and so on. This however is not carried so far, as that we can assume the collection to have been made for liturgical ends. The Rig Veda even contains hymns and parts of hymns, which the commentator, though very scrupulous in this matter, cannot assign to any religious observance. I rather believe than one can with full reason call the Rik the historical Veda. And its collection is a wonderful work, which attests the scientific perception of this people in an age which,—as I shall be able to show further on, reaches far above the age of the collection of the Homeric songs. There are united here more than a thousand of those sacred songs, with which the forefathers dwelling on the banks of the five streams supplicated prosperity for themselves and their flocks, greeted the rising dawn, sang the fight of the lightning-wielding god with the gloomy power, and celebrated the help of the celestials who had delivered them in their battles. And these songs are collected, not, perhaps, because the religious worship had occasion for them in this manner, but the whole treasure of this ancient poetry was to be here preserved uncur-

\* Rosen has indeed, on external considerations, published the first Ashtaka; the entire first Mandala would have been too extensive for him, for it contains 190 hymns, and reaches nearly to the end of the second Ashtaka.



tailed and well arranged. We should moreover deceive ourselves were we to believe that the Veda contains exclusively religious songs; a number of pieces have found their way into it, which have no reference to the worship of the gods.

In the tenth Mandala, e. g. in which a dice-player laments deeply his ruinous propensity, which against his best resolutions, seduces him again continually into new sin. Another piece in the seventh Mandala, ascribed to Vasishtha (of which Colebrooke has already given a passing notice) describes in a sportive way the revival of the frogs at the beginning of the rainy season, and compares their quacking with the singing of Brahma at a sacrifice. A very frequent form of hymn (of which examples are wanting in the part of the Rik already made public) is the dialogistic,—conversations of the gods among themselves, or of a god with a Rishi. In the fourth Mandala, e. g. Vámadeva speaks with Indra, and mocks him, “What can Indra forbid me? no one regards him either of the living, or of those who shall be born.” As to these and similar pieces the interpreters are at a loss how to assign the Rishi and the Devatá, (i. e. the inspired author and the god invoked;) but in the song of the gamester (abovementioned) they have preferred making the dice the deity (devata) rather than give up these unbending terms. But the less these remnants of ancient poetry are suited to the established frames of liturgical forms, the more worthy they undoubtedly are of our observation; and a representation of the most ancient circumstances of the people, and the character of this literature may in many respects be more easily acquired from these hymns, than from those constructed in more regular form. Yet I will not assert that these pieces belong to the oldest of all; on the contrary, the most of them bear plain traces of a later origin.

The Sanhitá of the Rig Veda thus claims to give the hymns complete, just as the Rishi has spoken,—or according to the expression of the interpreter,—has *seen* them. Not so the collections of the Sáma, and the Vájasaneyá Yajush. Both give single verses or single strophes, which do not at all necessarily stand in any internal connexion with each other, but only receive such connexion through the ritual which they accompany. In the Sáma I believe I have remarked besides, that not only the metre, which in virtue of its connexion with melody began very early to play an important part in sacrificial rites, but even



the accidental occurrence of the same or like-sounding words has frequently had an influence on the sequence of single verses. That the first principle of arrangement in both these Vedas is a liturgical one, needs no confirmation, and the most important thing which can be performed for either consists in the indication of this more or less loose connexion of the text with the ceremonial. An explanation of this principle, however, such as we demand, must necessarily go back to the connexion of the passages, i. e. to the *Rik*. Thus both (the *Sáma* and the *Yajush*) properly call for illustration in those points only where they depart from the first *Veda*.

For even were we to take up again the enquiry abovementioned into the relation between these three collections in respect of their origin,—for even were we to assume that the *Sáma* and *Yajush*, or one of them, had been compiled earlier than the *Rik Sanhitá*, still we shall not be able to deny that the hymns contained in the latter (the *Rik*) are the same from which those pieces (i. e. those contained in the *Sáma* and *Yajush*) were taken; we shall not be able to invert the relation so far as to hold the hymns of the *Rik* for mere deckings-out, amplifications of the ritual fragments. For the latter, as we find them in both of those collections, have no independent significance, they are taken away from a connexion, and in the former the shell would be of more importance than the kernel.

The assumption of a priority in the collection of the liturgical Vedas would however have in it nothing at all improbable. It is rather the natural course that the immediate want is first satisfied, before one arrives at the derivative one. These fragments were collected, as they were in use in religious worship,—remnants of complete songs, which had acquired importance for religious services before other portions of those hymns,—these, (I say) were collected because they were wanted for the regulation of the ritual, which in the sequel was to grow up into so huge a system. It was only in the second place that the collection of the complete hymns on which the ritual was based, was arrived at; and since those parts of hymns which the *Sáma* and *Yajush* contain were already guarded from alterations by writing and by their liturgical importance; whilst the undivided song existing as yet perhaps only in recollection, or scattered here and there, and as not immediately pertaining to sacred offices, was also less scrupulously

preserved,—it would be easily explicable if both those Sanhitás contained variations of the text, which as regards the passages concerned are older than the text of the Rik. We may even go further and grant that as the compilation of the Rik already in a certain sense rests upon a scientific want, so science also after the manner of ancient and modern times wished to do too much, that men had allowed themselves improvements and sought to restore uniformity, and that thus we had before us in the Rik a conscious retouching. Certain traces testify at least to external fusions; and although I cannot believe that the compiler of the Rik would have allowed himself to make essential and extensive alterations, yet I could not venture to pronounce against the assumption of a retouching, before we have before us the bulk of the textual variations of the Sāma, at least, which are far more important than those of the Vajasaneyé (Yajush). The above mentioned edition of that Veda will give the amplest information on this point.

As regards the Atharva, the question above proposed appears to be more easily decided. This collection contains, not single unconnected verses, but complete hymns, and has a real arrangement, (i. e. one depending on things, not merely formal.) In this respect it is like the Rik, and can really be called a complement of the first Veda, a complement meant to embrace the hymnologic productions of its time, when the mantra was already no longer an expression of immediate religious feeling, but had become a formula of incantation. This Veda therefore contains especially sentences intended to guard against destructive operations of the divine powers, against sickness and noxious animals, imprecations on enemies, invocations of healing herbs, and for all manner of occurrences in ordinary life, for protection in travelling, luck in play, and such like things. In the pieces which are common to it (the Atharva) with the Rik, it allows itself a great number of transpositions and alterations, which besides in most cases appear to be arbitrary. The language in those sections which are peculiar to it, approaches the flowing expression of later times, but has withal the grammatical forms of the older songs. Between it and the Rik there exists, further the peculiar relation, that the latter also towards the conclusion (in the last Anuvāka of the tenth Mandala) contains a considerable number of sections which bear completely the character of the Atharva-hymns, and are also actually found repeated in this Veda.

Besides these general tokens of a later origin of this Veda, we find yet further a number of particular marks among which I here adduce one. The hymns of the Rik variously celebrate the deliverances, which Indra, the Aswins, and other gods had vouchsafed to the forefathers. All the names of the persons so delivered, however, lie beyond the time of the author himself, and one seldom meets with the name of a Vedic Rishi. But in the fourth book of the Atharva there is found e. g. a hymn which invokes Mitra and Varuna to preserve the suppliant, as they had preserved—not Dadhyach, Rebha, Pedu, and others, but Jamadagni, Vasishtha, Medhâtithi, Purumilha, &c., all names of men whom tradition makes to be authors of the hymns of the Rig-Veda.

It thus appears, from all that has been said, to admit of no doubt that the Atharva has not only been later collected than the Rik, but has also a later origin, and in both together we have before us the mass of the hymns of two periods. To understand these in their whole compass, must clearly be the first thing which we can do in this province; and a recension of both these Vedas should therefore precede the investigation of the liturgical system, from which only, again, the Sâma and Vâjasaneyé can receive light. It is impossible to master perfectly the practical religious writings, the Brâhmanas, and what is connected with them without a knowledge of the text of the hymns, round which the whole ritual ranges itself; while, on the other hand, we cannot hope to be essentially advanced in the historical understanding of the ancient poems by means of a literature which has for that text only a stiffened sense, determined by the ritual. What we shall take from this literature is the explanation of single liturgical representations which are found already in the hymns. The whole system of worship is however in itself a very important object of investigation, and well worth the labour which its explanation will cost. The number of writings pertaining to this subject is extraordinary. All the Brâhmanas, a great number of Upanishads, and the numerous Srauta and Grihya Sûtras lie within the circle of these investigations.

In order now to give an account of how the Veda has come down to us, and of what has been done for the Rig Veda in particular by indigenous grammar and interpretation, I must speak of a class of writings, which to my knowledge have not yet formed the subject of discourse



in Indian literature, but which deserve in a high degree to be introduced into view,—the *Prātisākhya Sūtras*.

I have found out three writings under this title. That of greatest extent and importance is ascribed to Saunaka, and consists of eighteen *patalas*. A second book bears the name of *Katyāyana* (the same without doubt who is named as the author of the *Anukramani* to the *Rik* and to the *Vājasaneyī Sanhitā*,) and numbers eight *adhyāyas*. Finally, a third *Prātisākhya* is as yet without a (discoverable) author. The beginning of the text, as well as the commentary, which without doubt would have given some notice of the author, or the school, is wanting in the only MS. of this work which I have found at Oxford. I have but lately learnt that there are several writings of this name in the Berlin collection, and have as yet been able to procure no information respecting them. I conclude however from the statement of the extent of the Berlin MS. that none of them can be the *Prātisākhya* ascribed to Saunaka, the most important among the three. If the remark made on two Nos., viz. that they consist of three chapters, be correct, we shall find here yet a fourth *Prātisākhya*.

I must thus in my account confine myself to what I have been able to learn from the explanatory works as yet at my command, which, for the second and third of these books, are very imperfect. These writings contain rules on the elementary part of general, but particularly Vedic Grammar, on the accent, on *Sandhi*, on the permutation of sounds, (e. g. the *nati*, change of dentals into cerebrals,) on the lengthening of the vowels in the *Veda*, (*pluti*) on pronunciation, on the various *pāthas* of the *Veda*, &c. The first *Prātisākhya* contains besides a section on metre, which is far more valuable for the *Veda*, than the utterly unimportant book *Chhandas*, included in the *Vedānga*.

That the common denomination of these writings, *Prātisākhya-Sūtrāṇi*, cannot be the original one, results from the signification of the word; “grammatical aphorisms, current in single *Sākhya*s or schools.” In a commentary on *Gobhilās Srauta-Sūtras*, one of them is designated as *Mādhyandina-Sākhya Prātisākhya*, i. e. as a collection of those aphorisms which the well known Vedic school of *Mādhyandina* followed. But I conclude from a passage in the first book of the *Nirukta*, as well as from the introduction and the subscriptions to the chapters of the first *Prātisākhya*, that these books were at an earlier period



called Pārshada, i. e. "what is received from, or belongs to, the assembly," and to this appellation would be joined the particular designation of the school, thus Mādhyandina-pārshada, &c. The same passage of the Nirukta also shows that these books are older than Yāska, and that they were known by him as manuals of the different schools of grammarians (Karaṇa.) In order to arrive at an approximative determination of time, let us now assume,—according to the current and tolerably well established view,—the year 350 B. C. as the date of Pāṇini, let us further set Yāska only 50 years earlier, and we then have the end of the 5th century B. C. as the age of the latter. Since now Yāska is acquainted with the Prātisākhya, these must have been already composed and recognized as an authority in the 5th century B. C. These books, themselves, again, recognize a great number of still older grammarians (in all about thirty names) and even schools. These must therefore be assigned to the beginning of the 5th or end of the 6th century B. C.

In order to extend my demonstrations from this point, I must mention the various modes of writing the Vedas, the Pāthas. Of these, according to the representation of the Prātisākhya, there are three, the Sanhitā-pātha, the Pada-pātha, and the Krama-pātha. Sanhitā-pātha means the natural mode of writing, with observation of the rules of Sandhi. The Pada-pātha which separates single words, and comparatively speaking parts of words (elements of a compound word,) is sufficiently known by means of Rosen's edition. The Krama-pātha, of which we have as yet no printed specimen, is twofold, the *letter* krama, and the *word* krama (varna-krama, and pada-krama); the former always doubles the first consonant of a group of consonants (most MSS. of the Vājasaneyi are written in this way): the *word* krama takes two words of the sentence together, and always repeats the second of them with a following one. In this Pātha itself again a number of changes may take place, which I here pass over.

We know further the inventors of these modes of writing. Sākalya is named by Yāska as the author of the Pada-pātha, (at least for the Rig Veda) and other accounts which we have of him in the Prātisākhya and even in Pāṇini, do not contradict this statement. This grammarian and his school appear to have had a great influence generally on the conformation of the Veda, at least of the Rik. The orthography of

the MSS., as it has come down to us, and as it is fixed in the *Prātisákhyā*, even to the minutest particulars, is principally that of that teacher, and the *Anukramani* of the *Rik* ascribed to *Kátyayana*, calls the *Sanhitá*, of which it is the index, i. e. the *Rik Sanhitá* such as we now have it, *Sákalaka Rig Vedámnáya*, i. e. the redaction of the *Rig Veda* which has come down to us from *Sákalya's* school. Further researches may without doubt add more materials on this subject, and place yet more fully in the light the remarkable circumstance of the various redactions of the *Veda* in remote antiquity. Only we must, in this matter, beware of giving too much credence to the statements of the *Puráṇas*, which give us accounts of all possible *Sákhás* (schools or divisions) of this and that *Veda*. The numerous citations in older writings, even in the books which pertain to the liturgy of the *Veda*, will instruct us far more surely on these points.

In regard to the third mode of writing the *Veda*, the *Krama-pátha*, we know at least by a statement in the first *Prātisákhyā*, that the word *krama*, in its simplest form, derives its origin from *Panchála*, the son of *Babhrū*, (whom I have found named in no other place.)

It is easily seen that these different ways of writing the *Veda*, can have no other foundation than the securest possible preservation of the text, in a certain degree they also already aim at its explanation. The last named *krama* is nothing else than the introduction of the *pada-pátha* into the *Sanhitá-pátha* itself; each word appears first in its *pada*-form, and then in its connexion with the whole sentence.

But it will now be conceded that measures, thus carefully sought out, for the fixation of a text could not have been hit upon by its author, or even by a compiler, but must belong to a period for which this text was already something completely fixed, to which it was an object of study, and indeed the most careful, yea, minute study, and had even become a subject of controversy in the schools, (all of which can be established from the *Prātisákhyā*,)—in a word, to a period which was no longer certain of the sense of the *Veda*, and had to guard it, at least externally, by exact regulation of reading and writing, against the alterations of misunderstanding.

Supposing that we have found above that the teachers who are named in the *Prātisákhyā* as compilers of the *Veda*, *Sákalya* and others, must at least fall at the beginning of the 5th or the close of the 6th

century before our era, then we may conclude from the nature of that which they have done for the Veda, that several generations must have elapsed between the collection of those texts and them, and that consequently this collection cannot fall later than the 7th century. By what probable interval, again, the origin of these songs may have been separated from their collection, is a question which we shall never be able to answer with certainty, but to the solution of which we may approach tolerably near by means of the share which the compiler has had in producing the present form of the Veda, while this share itself will be on the one hand disclosed to us by the internal marks of the text itself, and on the other by a comparison of the *Sáma* and the *Vájasaneyi*.

How closely all these questions touching the Veda are connected with the history of the Grammar so remarkable for its high antiquity, appears from what has been said above. The Veda was the first object on which it exercised itself; and thus there lie in it united in their germ those sciences which at a later period diverged from each other, viz. the explanation of the Veda, and general grammar, of which for us the oldest representatives (who stand equally high in Indian literature) are *Yáska* and *Pánini*.

To the former the *Naighantuka*, and *Nirukta*, the sources of all later exegesis are ascribed. That both these are immediately connected admits of no doubt, but I believe that the *Naighantuka* is older than the *Nirukta*: the proofs of which I must reserve for another place. Thus *Yáska*, if the *Nirukta* belongs to him, could not be also the author of the *Naighantuka*. The last named little writing is in its first part a Vedic vocabulary, in the second, a collection of the more difficult or unusual words, taken from the text of the Veda, and ranged together without any alteration or explanation. The third part is a collection of the whole of the names of the gods according to their three domains (*sthána*) earth, air and heaven. The *Nirukta* itself is nothing else than an explanation of the *Naighantuka* (hence, too, its name) to the citations of which it adds the passages of the texts, and comments on them.

People have been hitherto inclined to attribute a very high antiquity to the *Nirukta*. That it belongs to the oldest part of Indian literature that we possess excepting the Vedic writings, is not to be doubted; it



shows however, by its contents that it belongs to an already far advanced period of grammar and interpretation. That however it is older than Pánini, we may conclude from the less developed state, particularly of the technical part of grammatical science in the Nirukta. For along with a certain richness of grammatical expressions, it still wants the greater part of those peculiar technical terms, of which it is not credible that they were wholly Pánini's own creation. Yáska is entirely ignorant of algebraical symbols such as Pánini has. That the latter makes no mention of Yáska, though he had in many places an opportunity of doing so, can no longer strike us now that we know so large a number of decidedly older grammarians of whom he makes no mention; and would at most show that in Pánini's time this book did not yet enjoy that general circulation and esteem, to which it latterly attained. The introduction to the Nirukta, very remarkable in many respects, which contains the sketch of a grammatical and exegetical system, makes us acquainted with the views of Yáska and his predecessors, and it is in this way possible for us to institute a complete comparison between these older grammarians and Pánini. For this I believe I may be permitted to refer to the edition and explanation of the Nirukta, which I think of sending to the press without delay. Let me only be allowed to examine somewhat more closely one section of that introduction, which is calculated to throw light on the age of the Veda, and of its interpretation.

Yáska mentions the opinion of the Grammarian Kautsa that the songs of the Veda are inaccessible to grammatical and logical interpretations; for their sense, says Kautsa, is fixed by the Bráhmanas and by the use of the hymns in the ritual, and thus forbid a free explanation. The hymns, says he further, even contain what is absurd and impossible; they contradict themselves, when e. g. they say "There is but one Rudra and no second;" and again "numberless are the thousands of Rudras on the earth;" finally they contain, Kautsa thinks, passages completely unintelligible. To the last reproach Yáska replies, it is not the fault of the beam, if the blind man does not see it, but of the man; and tries to refute or explain the rest in detail. That the sense of the hymns is determined by their ritual signification, as the latter is taught in the Bráhmanas is (he thinks) by no means a fault, since these books give the correct meaning. Yáska (as is further clear from a number



of other passages of the Nirukta) and before him Kautsa, had thus already before them the whole system of the ritual, and the exactly regulated application of the Vedic texts in religious services; they were acquainted with a number of the fundamental works of the Kalpa, of the Bráhmaṇas; and the rationalistic Kautsa could count the Veda senseless and the Bráhmaṇas as false representations. A conclusion may hence be drawn as to the length of time\* which must lie between this grammarian and the Bráhmaṇas; and as to what further period again must intervene between these liturgical writings and the Veda, which they explain allegorically and mystically, and recognize as already collected and arranged in the way in which it has come down to us; of which, e. g. the Aitareya Bráhmaṇa gives the most numerous proofs.†

By means of Buddhism we have, from quite a different side, a proof, which chimes in with the above, for the antiquity of the scientific treatment of the Veda, and the extended development of the ritual; and I mention this only to show how that which we discover through the serial sequence of the Vedic writings, is confirmed through what is as yet the most certain historical channel. Sákyaṃuni comes as the proclaimer of a new religious truth, by which the limits of the way of salvation, the mass of the bráhmaṇical institutions are torn down. His doctrine is a refuge even for Bráhmans, who were unable to encounter the difficulties of their own complicated system.‡ If Buddhism could have such an importance in the 6th or 5th century B. C., then must that entire edifice of worship and ceremonies, which is based on the practical part of the Veda, the Bráhmaṇas, have been long before erected.

\* This appears to be the place to which Note 6, which has been translated below refers. The figure of reference, however is not in the text.

† Let me be allowed to remark here by the way on the Aitareya Bráhmaṇa, that this book, which is the highest degree remarkable not only for its liturgical contents, but also, for a mass of historical notices and legends, and on which we have a most excellent commentary of Sáyana, is being prepared for publication by my friend Dr. C. Rieu. It is certainly one of the oldest writings of this kind, and its explanation will form the basis of our knowledge of the ritual.

‡ E. Burnouf, Introduction à l'histoire du Bouddhisme, p. 196. Il est avéré pour nous, que la doctrine du Cakja était devenue probablement assez vite une sorte de dévotion aisée, qui recrutait parmi ceux, qu'éfrayaient les difficultés de la science bráhmaṇique. En même temps que le Bouddhisme attirait à lui les Bráhmans ignorants, il accueillait avec un empressement égal les pauvres des toutes conditions, etc.

These books themselves are the oldest commentaries of the Veda, and bear witness to the existence of a grammatical science, which therefore must have preceded Buddhism also.

Near and immediately after the Bráhmaṇas, there may, yet further, have existed a proper and independent interpretation of the Veda, but this has been without doubt confined to the more difficult and important passages; and the Naighantuka may have been a collection of such sections, as used especially to be explained in the schools. Continuous commentaries probably did not then exist; and that of Mádhava and Sáyana, composed in the middle of the 14th century of our era is indeed the first and only complete gloss of the Rig Veda. From the long series of centuries which lie between Yáska and Sáyana but few remnants of an interpretative literature connected with the first Veda have remained to us, or at least have as yet been discovered. Sánkara and the Vedantic school had turned chiefly to the Upanishads. Nevertheless a scholar of Sankara, Anandatirtha, has composed a gloss on one part of the Rig Veda, at least an explanation of which by Jayatirtha, embracing the 2nd and 3rd Adhyáyas of the 1st Ashtaka is to be found in the library of the East India House in London. The mode of explanation is essentially the same as we have in Sáyana, only we can frequently reproach it with a still more violent treatment of the text. Sáyana himself, who is not always scrupulous in stating his sources, besides the Niruktatíká of Durgá, a fundamental book which has been preserved to us, cites also Bhattabkáshara Misra, and Bharataswámi as interpreters of the Veda. Of the former I have seen at least a commentary on a section of the Yájur Veda, on which he appears to have given a complete comment. Sáyana's citations do not by any means necessarily show that he has given any explanation of the Rik.

Finally, Sáyana's commentary itself, which is already in some measure known by Rosen's extracts will always remain our principal source for the interpretation of the Veda, as well as a mine for the history of the literature generally. It belongs, it is true, to a period in which Vedic studies were but artificially revived, and to the range of whose view that ancient literature lay so far off that we cannot conceive it to have been distinctly understood;—it is entirely dependent on what is more ancient, and especially makes the most extensive use of the Nirukta and Naighantuka, but still it gives without doubt all which the indige-

nous literature of its time could furnish. As its completeness has had for us the unfortunate consequence of throwing into oblivion older writings of a similar purport, so have we also in it the most essential results of this earlier literature, and we could certainly desire nothing more important for the furtherance of Vedic studies than a complete knowledge of the Sanhitá of the Rig Veda and its copious commentator.

It affords me peculiar pleasure to be able to conclude with the announcement that such a work is being prepared in England. For it science will be indebted to Professor Wilson, the man whose industry has already opened the way in so many provinces of this literature, and who is daily rendering to these studies, the most essential services by the unsurpassable liberality with which he first has afforded access to the richest Indian library. Under his guidance it will become possible for younger powers, among whom, along with Dr. Trithen in London and Dr. Rieu of Geneva, I may reckon myself, to make accessible to study these extensive materials for the explanation of the Veda.

#### EXCURSES AND ANNOTATIONS.

1. *The Mandalas*.—In the introduction to the Anukramaniká of the Rigvéda, chap. 2, it is written: atha rishaya: satarchina ádyé maṇḍalé, antyé ksudrasúktá, madhyaméshu mádhyamá: (MS. 132, E. I. H.) that is, the authors of the hymns of the first Maṇḍala are called authors of a hundred verses, those of the last, poets of the great and little hymn, and the authors of the intermediate Mandalas, the mediate. This explains Shaḍgurusishya (No. 1823, E. I. H.) the commentator of this book, as follows: Ádyamaṇḍalasthá rishaya: satarchina iti sanjnitá: (risá shatán chatarchan). To which the following verse belongs:

dadarsádau Madhuchandá dwy-adhikan yad richán satan,  
tat-sáhacharyád anyé 'pi vijnéyás tu satarchina.

“Because Madhuchandas at the commencement (of the Rigvéda) has composed 102 verses, (hymns 1—10) the others also who are placed along with him (in this Maṇḍala) are called authors of a hundred verses.” The name, however, appears to be owing to the circumstance, that the greater number of the Rishis, enumerated in the first book, are authors of about a hundred double-verses, for instance Suna: Képha of 97, Kanwa of 96, Praskanwa of 82, Paruchépa of 100 double-verses.

The name of the Rishis of the last or 10th Maṇḍala is thus explained:



násadásit-púrwan mahásúktan, paran kshudra-súktan, (tat.) súktadarsitwád antyé dasamé maṇḍalé sthitá rishaya : kshudrasúktamahásúкта-námána : that is “What is antecedent to násad ásit, is called the great hymn (the collection of great hymns) what succeeds it, the little hymn.” The hymn, as here alluded to, commences at the 11th Anuváka of the 10th book. The hymns of the 10 first chapters are also called the great undoubtedly, but in distinction from the 63 very short hymns of the 11th and 12th chapters, which hymns moreover bear a peculiar character.

The Rishis are all enumerated in the Grihyasútras of Aswaláyana, book 3, ch. 4, (MS. 129, E. I. H.) on the occasion of the special kind of honour due to them in connexion with the perusal, as prescribed, of the sacred books (Swadhyáya). I quote here the whole passage ; for although it probably does not originally belong to these Sútras, yet it is important for our knowledge of the extent of the Védic literature, and also of that which is held of the same authority, and it shows in a striking manner, how many works of this period are entirely unknown to us !—“Atha rishaya : satarchino, mádhyamá Gritsamado, Viswámitro, Vámadévo trir, Bharadwájo, Vasishta : Pragáthá pávamánya : Ksudrasúktá Mahásúktá iti, Práchínávítí Sumantu-Jäimini-Vaisampáyana, Paila-sútra-bháshya, bhárata-mahábhárata-dharmá-acháryá Jánanti-Bárhavi, Gárjya-Gautama-Sákalya, Bábhavya, Mándavya,—Mándúkeyá, Gargi, Váchaknaví, Vadavá, Prátitheyí, Sulabhá, Maitréyí, Kaholan, Kaushítakan, Mahá Kaushítakan, Paijyan, Mahá-paijnan,\* Sujajnan, Sánkhyáyanam, Aitaréyan, Mahaitaréyan, Sákalan, Báshkalan, Sujátavaktram, Audaváhim, Mahandaváhim, Saujámim, Sannakam, Aswaláyanam, yé chányé ácháryás, té sarvé tripyantw iti.

The divisions of the single Mandalas are as follow :

1. Mand. the Mandala of the Satarchina Rishis, containing in 24 Anuvákas 191 Súktas (hymns) by Rishis of different families, includes Asht I. to II. adhyáya 5, varga 16.

2. Mandala, the Mandala of Gṛitsamada. Ast. II. 5, 17 to 8, 12. 4 Anuvákas, 42 súktas (an. 1 súkt 4—7, are ascribed to Somáhuti, the son of Bhrigu. Anuv. 3, 5—7, to Kúrma, the son of Gṛitsamada, or to the latter himself.)

\* MS. 986 has the same reading ; but MS. 1839, E. J. H. give the correct one, Painjyan, Mahápainjyam.



3. Mand. Viswámitra. Asht. II. 8, 13 to III. 4, 11—5 Anuv. 62 súkt. (anuv. 5, súkt. 1—3—are ascribed to Prajapati, the son of Viswámitra, or of Vák (goddess of speech.)

4. Mand. Vámadéva. Asht. III. 4, 12 to 5, 11.—5 Anuv. 57 súkt.

5. Mand. Atri and Rishi of his tribe. Asht. III. 8, 12 to IV. 4, 34—6 Anuv. 79 súkt.

6. Mand. Bharadvāja. Asht. IV. 4, 39 to V. 1, 21—6 Anuv. 75 súkt.

7. Mand. Vasishtha. Asht. V. 1, 23 to 7, 9—6 Anuv. 104 súkt. (Kumára, son of Agni or Vasishtha, is the author of anuv. 6 súkt. 12 to 13).

8. Mand. Asht. V. 7, 10 to VI. 7, 15—10 anuv. 101 súkt. This was before mentioned under the name of Pragathás, according to the commentators a hymn, of which the uneven verses are bṛhati, the even verses sato-bṛhati, that is to say, a hymn composed of verses of four lines, and of which the first line contains two padas of 8 syllables each, while the second, third and fourth lines are composed of a pada of 12, and another pada of 8 syllables. As this Mandala commences with a Pragátha of the kind, which is ascribed to Pragátha, the son of Kanwa, and moreover contains some other hymns of the same Rishi, the name is probably a quibble on the two meanings of the word. The greater number of the Rishis belong to the family of Kanwa.

9. Mand. Asht. VI. 7, 15, to VII. 5, 28—7 anuv. 114 súkt. The Pavamánayas (probably richas) or according to the commentary of the Anukramaniká pávamánan saumyan maṇḍalam, hymns of purification.—The hymns of this book, for the greater part ascribed to the Agirasides, refer without exception to the extracting and purification of the juice of the Soma-plant.

10. Mand. Asht. VII. 5, 29 to the end. The Kshudrasúktás and Mahásúktás, 12 anuv. and 192 súktas.

The name of the 9th Mandala, is found in Yáskás Nir, X. 2, tasya pávamánishn nidarsanáyodá harishyáma ; ॥ “to prove this we shall take an example from the pávamánayas ;” he then gives the quotation from the 9th Mandala.

There is in this Veda something quite peculiar which is in connexion with the division above mentioned, and which to a certain degree may

be considered to bear evidence to its (of the division's) authority, viz. the frequent introductions of more or less long episodes between the Anuvákas or Mandalas. We are justified in marking these episodes, which generally are without accents, as additions, by the circumstance, that they are not found in the Anukramaniká and Pada-páṭha. Nor are they in the division made according to Ashtakas; that is to say, although occurring in the MSS. following this division, they are not taken heed of in the enumeration of Vargas and Adhyáyas, which is made according to a certain numerical arrangement. Agreeably to these authorities Sáyana also omits them. That these additions, however, are not a new creation of the copyists, is evident from the fact, that the Nirukta already knows some of them, and in the very same places, where they now occur in our copies of the Veda.—I quote the more examples such as these, as this kind of critical examination of the text is undoubtedly the only one which we can make use of, with reference to the Veda; for in the whole Sanhitá of the Rigvéda I have not met with a single passage, which, when compared with other MSS. or such books as the Nirukta, the Aitaréya Bráhmaṇa, the Sūtras of Aswaláyana, which are full of quotations from the Veda, offer one single difference—a certainty of the text which is to be attributed to the early examination and authentication of the Veda. All variations, it appears, must be looked for previously to the recording of the hymns by writing and to the treatment of the same in the schools. All these differences are now limited only to the various readings of the text in the several collections of hymns.

The two most careful copies of the Sanhitás which I examined, viz. Nos. 199 and 200 of the Dévanágari MSS. in the Royal Library at Paris, and Nos. 129—132 of the E. J. H. (Cod. Colebr.) give between the third and fourth chapters of the 9th book (132 with the special title of Sūkta) 20 verses, addressed to the Pávamányas (the hymns of the Soma-purification) themselves, and for this reason they must be considered of later origin. This section is wanting in the Anukramaniká and in the text of Padas, although Yáska quotes the third Rig (Nir. V. 6.)

At the close of the second Mandala (ascribed to Gṛtsamada) the two MSS. alluded to, give five verses (without accents in either, while the preceding and subsequent portions have accents) which bear a like-

ness to some of the Atharva hymns, and are evidently added to the two preceding hymns on account of the identity of the subject. They are neither in the Padapáṭha and Anakramaniká nor with Sáyana. I quote them here to furnish an example of this later formal kind of poetry.

- 1.—bhadran vada dakṣiṇato, bhadram uttarato vada |  
bhadran purastán no vada, bhadran paschát kapingala ||
- 2.—bhadran vada putrair bhadran vada grihészhu cha |  
bhadran asmákan vada bhadran no abhayan vada ||
- 3.—bhadran adhastán no vada bhadram uparishtán no vada |  
bhadran bhadran na ávada bhadran na : sarvato vada ||
- 4.—asapatnan purastán na : sivan dakṣiṇatas kridhi |  
abhayan satatan paschád bhadram uttarato grihé ||
- 5.—yauvanáni mahayasi jigyushám iva dundubhi : |  
sakuntaka pradakṣiṇan satapatrábhi no vada |

Yáska cites the first Rig of this Súkta (Nir. IX. 5), and expressly ascribes it to Gṛitsamada ; he has, however, the various reading Kapin-jála. We observe, that what has been said about the absemet of various readings, does by no means apply to these additions ; to which the following quotation bears a further evidence.\* Mand. VII. anuv. 6. at the conclusion of the hymn above alluded to, which is addressed to the frogs, we find a verse not enumerated in the Anukramaniká, and also omitted in the Padapáṭha and in Sáyana, which differs even in metre from the hymn to which it is added. In most of the MSS. it runs thus :

upaplavada, maṇḍúki, varsham ávada táduri |  
madhyé hradasya plavaswa vigrihya satura : pada : †

I have compared for this passage seven MSS., viz. those of Paris, Nos. 131, 2135, 1691, and No. 2379, of the E. I. H, and two MSS. from Oxford (without numbers.) With the exception of No. 2379, E. J. H., all of them give this verse. No. 1,621, E. I. H., and one of the Oxford MSS. mark it as Parisishtam (omitted) which is the common way of introducing an interpolation. It is ascribed by Yáska to Vasishta, and closely follows the first Rig of that hymn, to which it is also added in the Nirukta. The three MSS. of the Nirukta, compared

\* This passage, however, is only met with at the end of a Súkta, not of a Anuváka.

† Others read : upaplavata, upapravada, maṇḍúká, plavasya, paras. The more exact examination of this passage shall be made by me in the Nirukta.



by me, offer the same variations. Now the identical verse occurs in a passage of the Atharvana Sanhita (IV. 15,14) in the same manner closely following the Rig, which is the commencement of Mand. VI. 6, 14. (according to the Atharva, MSS. Nos. 1,137 and 682, E. J. H., as above, save upapravada.) It has therefore almost the appearance, as if Yáska had at the same time referred to either Védā, to the Atharva for the similarity of the connexion, and to the Rig for mentioning Vasishta as author, and it is very probable, that the verse has found its way into the Rig, and into that very hymn in consequence of having been mixed up with fragments of the same (hymn) in the Atharvana Sanhita. That in general a great number of such interpolations owes its origin to the Atharva, has been always my opinion, which we shall have the means of proving, after we know this Védā more exactly, although the examination of the same, in want of all Indian aids, requires an editor extensively read in Védic literature.\*

Of a very different kind are additions, which occur only in one or the other of the MSS., and generally present all the colours of later poetry. Thus gives the Paris MS. a long hymn, addressed to Sri. The same MS. and No. 131, E. J. H., present at the end of Anuv. 3 of the 7th book an interpolation, bearing evidence to the worship of serpents.†

An edition of the Riksanhita cannot of course reject such of these passages as are found in agreement with each other in the greater number of MSS., because they are undoubtedly interesting to us, and, as has been proved before, must have been introduced in a comparatively remote period. On the other hand, the additions that occur only in one or the other MS. and are stamped with the decisive character of a later time, should at least not be taken into the text. The result which we arrive at relative to the history of the Vedic texts, from such scattered remarks as we have made, is perfectly consonant to the conclusion we derive from the Prátisákhyā Sūtras. It is evident,

\* To be complete, I give another example. The Bríhatī, quoted in the Nirukta IX. 29, á rátri párthivan etc. is interpolated at the end of Riksanh, M. X. 10, 15 (and does not even occur in No. 132 E. J. H.)

† I found the same passage also in a Paris MS. of the title of Mantra Sanhitá, chiefly giving parrallel passages from the Rig. (Erl. 94, 6) but am unfortunately unable to state, whether it follows the same hymn, to which it succeeds in the Rig, as I was at that time not aware, of the presence of this section in the Rig.



that these texts at an ancient time were already perfectly authenticated, arranged and divided. None dared to alter them ; additions were ventured at only between the divisions. The Anukramaniká, perhaps from time immemorial, protected the original text from coalescing with the additions of a later period. Although I am not as yet able to prove that Yáska knew this index to the Véda, yet I have not found any evidence to the contrary, and I do not hesitate to consider it more ancient than the Nirukta.

It has been before incidentally mentioned, that the Ashtaka division goes along with the Anukramaniká. As far as I know, they differ in a single instance only,—viz. the fourth Adhyáya of the 6th Ashtaka, as it now is found in the MSS., gives 54 Vargas, although it should according to the rule have only 30 to 35. Here then must be something superfluous, which does not originally belong to the Ashtaka division. Which part is superadded, we may perceive for instance from Sáyana's commentary, which agreeably to the other division, closes the 6th Anuváka with the 15th Varga, and commences the 7th with the 32 (of the MSS., according to him the 14th.) The Vargas 14 to 31 (of the MSS.) do therefore not originally belong to the Ashtaka division. The Anukramaniká, on the other hand, enumerates them and gives also the names of their authors. They accordingly appear to have been included in the Mandala-division. To explain this deviation, it might be either supposed, that the enumeration of these 18 Vargas in the Anukramaniká is spurious, which would be supported by the omission of the whole passage in the commentary of Shadgurusishya to the Anukramaniká (according to two MSS. 1832 or 2396, E. J. H.) or it might be supposed, that at a later period these 18 Vargas were considered an independent section, consonant to itself, which might be separated from the collection of the hymns of the Rig. To this view refers the circumstance, that this passage, for instance in MS. 131, E. J. H., has the separate title Vá lakhilyam, (and it concludes with Vá lakhilyán samáptam) and the statement of Sáyana in his commentary to the Aitareya Bráhmaṇa VI. 28 (where also, c. 24, a fabulous derivation of the word is given) Vá lakhilyákhyair munibhir drishtá "abhi praityádiké 'shtake sthitá richo Vá lakhilyábhídhá : | ta éva vā lakhilyákhyé granthé samāmnátá : | tá : sarvá Maitrávaruṇa : sansét" (MS. 1836 E. J. C.)

“The verses, composed by the sages Válahkilya, which occur in the 8 hymns commencing with abhi pra, are called Válahkilya. They are recorded in the book, called Válahkilyam. To recite all such hymns is the duty of the Maitrávaruna” (a certain priest.)

By this statement of Sáyana some clue may perhaps be given, how the Rik-Sanhitá can include some greater or lesser portions, which, having an independent existence and being already arranged in a certain succession, may among certain tribes have had an authority at the performance of some peculiar sacrificial ceremonies. Even the passage of the Aitareya Bráhmaṇa just mentioned notices a peculiar application of the Válahkilya in the sacrifice.

## 2. *The reading of the Vēda in the School.*

I now give an extract from the 15th Paṭala of the first Prátiśakhya (according to Dev. 203 Royal Libr. at Paris and 28 of the E. J. H.) This chapter treats on the Párayāṇa, or reading of the Vēda, and we learn from it, how the mode of recital, prescribed in the same, is exactly the same oral proceeding, which is performed in writing within the Páṭhas or modes of writing we shall further on more closely discuss.

When the teacher has seated himself towards the East, the North and North-East, and has received the salutation from this disciples, he replies to them by an Om of 3 to 6 Mátrás, and then commences to recite the Vēda. Two or more words having been recited by him, they are repeated by the disciple, sitting to his right, and afterwards by the others in succession. A Prasna thus completed is also repeated by all of them. Lastly the passage of the text is to be repeated in such a manner, that, as in the Padapáṭha, certain compounds are separated, and accompanied with the particles cha, gha, hi, vá, and under certain conditions with iti, just as is the case with prepositions.

A prasna, it is said, is a trīcha (three verses) in the metre pankti a trīcha or dwricha (two verses) in longer metres two and two verses. If a Sūkta (hymn) is limited to one verse (of which the only instance is Asht. I. h. 99) it forms a Prasna.

Yé (viz. prasná :) shashtir adhyáyé upádhiká va. “Of such questions (or small sections) the lesson contains 60 or more.” (vide supr.)

3. The following fragments, which are moreover remarkable for the geographical names they contain, may be given as examples of

the curious personifications, by which in the Atharvéda, animals, plants and even diseases are invoked. The passage is taken from K. V. 22, (according to the Paris MS. and No. 682 E. J. H.)

Agnis takmánam apabádhatám ita : somo, grává, varuṇa : pútaḍakshá :  
védir, barhi : samidha : sosucháná apa dwéshásy amuyá bhavantu || 1  
ayan yo viswán haritán krínoshy | uchchochayann agnir ivábhidunwan |  
adhá hi, takmann, araso hi bhúyá | adhá juann adharán vá paréhi. || 2

Oko asya Mújavanta, oko asya Mahávrishá : |

Yávaj játas, takmans, táván asi Vahlikéshu nyochara : 5\*

takman, Mújavato, gacha, Vahlikán vá parastarán |

Súdrám icha prabharoyan, tán takman, víva dhánuhi | 7

Mahávrishán, Mújavato bandhv addhi parétya | \*\*

praitáni takmané brúmo anya-kshétrāṇi vá imá || 8

Takman bhrátrá balásena swasrá kásikayá saha |

Pámná bhrátrivyéna saha gachámum arāṇan janān || 12

Gandhárībhyo, Mújavabhyo, 'njébhya, Magadhébhya : |

praishyan janam iva sévadhīm takmánan paridadmasi || 14

1. Agni, drive away from here Takman (may drive him away) Soma, the (sacrificial) stone, Varuna of pure strength, the fire-place, the sacred straw, the burning wood. Be away from here envious men.

2. Thou who maketh yellow the whole body, who giveth pain like fire when burning upwards, thou, O Takman, nevertheless, lose thy power, pass by, moving downwards or from underneath.

3. His house are the Mújavat, his house the Mahávrisha ; whenever thou art born, O Takman, thou goest to the Vahlíka.

7. Go to the Mújavat, Takman, or to the distant Vahlíka, desire the Súdra for nourishment. These, O Takman, somewhat shake.

8. Devour the Mahávrishas, the Mújavats, passing over from us ; we leave these or other foreign countries to Takman.

12. Takman, with thy brother Balása (dejection) with thy sister Kásiká (cough) with thy brother's son Páman (itching) go to that foreign people.

13. We give Takman as a messenger, as a treasure, to the Gandhárís, the Mújavats, to the Angas and Magadhas.

\* I am unable to correct the gnykaras after two MSS. No. 682 E. J. II. reads Vahlikésha gnyokara : | the meaning, however, is evident.



It is evident, that under Takman some disease must be understood, but which, the passage does not define. K. V. 4 is invoked the medicinal herb Kushta, which grows on the Himavat, and is repeatedly called takmanásana (destroyer of Takman); according to Wilson kushta is the plant *Costus speciosus*. The variety in writing must undoubtedly be ascribed to the MS., and as kushtha means also leprosis, and the plant probably has the name from its power to heal that disease, takman, no doubt, signifies a similar cutaneous disease, to which the 2 rig alludes.

To 5. I meet again with the Mújavats in the Vajasanéyasauhitá III. 61 état té Rudrávasan téna paro Mújavata 'tíhi | avatata-dhanwá piná kávasa: Krittivásá ahinsan na: sivo 'tíhi || (according to No. 2391, E. J. H.) "This is your travelling fare, Rudra; with this proceed further far to the Mújavats. With bow unbent; the staff in hand, clothed with skins, without harming us, may he graciously proceed on." Mahídhara explains the Mújavatas, as follows: Mújaván náma kachit parvato Rudrasya vámathánam | . . . mújavata: parvatán pá: pábhágavartí (para: parabhágavartí) san, atikramya gacha: "Mújavat is the name of a mountain, the favourite abode of Rudra, &c. therefore proceed beyond the Mújavat mountains." Durga, the commentator of the Nirukta (ap. I. C.) simply explains the word by parvatát, and consequently takes it as the ablative. According to Nirukta IX. 8, Mújaván is the same with parvata, and we find in Rik. X. 3, 5, 1, somasyéva maujavatasya bhaksha; as the enjoyment of the mountain-born Soma. The Mújavats are therefore mountaineers, and as they in V. 7, are mentioned in connexion with the Vahlikas, and V. 14, in connexion with the Gandháris, we have to consider them mountainous tribes to the N. W. The Mahávrchas (magni libatores or validi progenitores) according to V. 5 and 8 must be assigned to the same countries. All agree, that the Vahlikas are a Bactrian nation. (Lassen, Zeitschrift II. p. 53 etc. Wilson, Vishnu P. p. 191.)

Prabharvyan (681, E. J. H. reads, however, Prapharvyan) from bharvati, according to Naigh. II. 7, attikarmá, consonantly to the Nirukta IX. 23, where we meet with the proper name of Súbharva. That we have under the name of Súdra not to think of the later caste, but of a nation of this name, appears to me beyond doubt, until the castes can be traced in the Védic hymns. I am not aware of any such



passage. (The Xndra or the Squadra of the cuneiform inscriptions of Persepolis cannot well be here expected) ; with Lassen we must consider them the *Συδράκαι* (or *Ὀξυδράκαι*) who appear to the N. W. of the Indus. See also Wilson's Vish. P. p. 195.

12. The meaning of *araṇa* as foreign, distant, is authorized by the passages in the Rik. X. 5, 3, 16. *Sá no amá so araṇe nipátu*, she may protect us when near, she may protect us, when distant (in foreign parts, in and out of the house. Durga's Commentary on Nirukta. xi. 46.) Nir. III. 2. *parishadyan hy araṇasya rekṇo nityasya ráya : pataya ; syáma ;* "for we must avoid *foreign* property, may we be lords of perpetual property" (Durga on Nir. III. 2, where there is the question of possessing children, *araṇa-parakulajáta*. Sayána ad. I. without any reason *anriṇa*.)

14. Lassen has at several places with full certainty assigned to the Gandharas the eastern Kabulistan as their original abode. From Védic works I can only add, that the wool-clad sheep of the same were famous, according to Rig. I. 18, 6, 7. *romasá Gandhárinám iváviká*, haired (woolly), like a sheep of the Gandharas. In the Aitareya Bráhmaṇa VII. 34, there appears *Najnajit*, the Gandhara, among those who have learnt from Parvata and Nárada the knowledge of a certain ritual. From the nation of the Gandharas extending into the Punjaub it can be explained, that one of their princes appears among such as are under the protection of the Bráhmanical worship, while the nation in the passage of the Atharva alluded to is counted among the foreign and distant nations.

As the Anga, also in the poetry of a later period frequently referred to, must be supposed to have had their abodes on the Ganges about Bhágalspur, and the Magadhas in South Behár, we have in v. 14 two and two nations for the two frontiers in N. W. and S. E., consequently at the time of the composition of this hymn, the country of the Bráhmanical worship appears to have been comprehended by these two extremes, and the country beyond the river Soná (Sone) to have been considered not Indian.

*Sévadhi* has not yet obtained in ancient Sanscrit the meaning of a treasure of *Kuvéra*. Nir. II. 4, it is identified with *nidhi*, compare Rik. Asht. VI, 4, 19 *sévadhipá*.

As an example of another kind of incantation the following verses may be considered. Ath Sanh. III. 2.

Munchámi twá havishá jivanáya kam Ajnáta jakshmád utá rajá jákshmát ।

Gráhir jagráha yady étad énam tasyá Indrágni pramumuktam énam ॥ 1

Yadi kshitáyur, yadi vá paréto, yadi mrityor antikam níta éva ।

Tam áharámi nirritér upasthád aspársam énam sata sáradáya ॥ 2

1. With this havish (sacrificial butter) I liberate thee for thy life, from the concealed consumption or from the pulmonal consumption ; when the attacker has attacked him, then liberate him from the same, Indra and Agni.

2. If his life be consumed, or if he went already, or if he has been led near to death, then I will bring him back from the brink of death uninfested to a life of a 100 years.

4. Atharvana Sanhitá, K. IV. 29. (M. 682. E. J. H.)

Manwé vá Mitrá-Varunáv ritávridhau sachétasau druhvaṇo jau nudéthé ।

Pra satyávánam avatho bharéshu tan no munchatam anhasa : ॥ 1

Sachétasau druhvaṇo jau nudéthé pra Satiávánam avatho bharéshu ।

yav gachatho nrichakshasau babhrú ná sutan tau no . . . . ॥ 2

yáu Angirasam avatho । jau Vasishthan tau no . . . . ॥ 3

yau Syáváshwam avatho, Vadhryaswan, Mitrá-Varuná, Purumilham, Atrim ।

yau Vimadam avatha : Suptavadhrim tau no . . . . ॥ 4

yau Bharadvájam avatho, yau Gavishtiran, Viswámitran, Varuṇa Mitra, Kutsan ।

yau Kakshívantam avatha : prota kaṇwan tau no . . . . ॥ 5

yau Medhátithim avatho, yau Trisokan, Mitrá-Varunáv, Usanám Kávyan yau ।

yau Gotamam avatha : prota Mudgalan tau no . . . . ॥ 6

yayo ratha : satyavartma 'rjunasmir mithuyá charantam abhiyáti hrishayan ।

Stanmi Mitrá-Varunau náthito johavími tau no munchatam anhasa ॥ 7

1. My mind is directed to you, Mitra and Varuna, you that increase what is right, you of benevolent mind that repel all that is hostile, that protected Sátyávan in his fights. Do liberate us from peril.

2. You benevolent who repel the enemies, who protected Satiávan in his fights, who approach (for assistance) you guides of men, as the horses of Indra to the libation.—Do liberate, etc.

3. Who protected Angirasa, and Agasti, Mitra and Varuna, Jamadagni and Atri, who protected Kasyapa and Vasistha. Do liberate, etc.

4. Who protected Syávaswa, Vadhryaswa, Mitra and Varuna, Purumilha, Atri, who protected Vimada, Sáptavadhri. Do liberate, etc.

5. Who protected Bharadvája, Gavishthira, Viswamitra, Varuna, Mitra, Kutsa, who protected Kakshivat and Kanwa. Do liberate, etc.

6. Who protected Medhátithi, Trisoka, Mitra, Varuna, Usana, the son of Kaviya, Gotama, Mudgala. Do, etc.

7. The Chariot of whom running on the right road, with tight rein, overjoyed passes the racing.

I praise you, Mitra and Varuna, I invoke you praying.

I here give the proof, that the greater number of the persons, mentioned in the hymn, are Védic Rishis.

Jamadagni is (according to the Anukramaniká and other sources) author of VIII. 10, 8. IX. 3, 2, 3, 6. 3, 7, 6. IX, 7, 4, 6. X 10, 11, 12, 16. 22.—Atri, author of several hymns in the 5th book, Kasyapa for I, 15, 6. VIII. 4, 9. IX. 3, 4. 3, 7, 2. 5, 6. 5. 7. 7, 4, 2. IX. 7, 10. The whole 7th book and several parts of the 9th are ascribed to Vasistha. Syávaswa (from Atri's family) V. 4, 8 to 5, 5. 5, 10. 6, 9, and 10. VIII. 5, 5 to 8. IX. 2. 8. Purumilha (with Ajamitha, both sons of Suhotra) IV. 4, 11 and 12. VIII. 2, 8. Saptavadhri (from Atri's family) V, 6, 6. To Bharadvája the greater number of the hymns of the 6th book is attributed, to Viswamitra the third book, Gavishthira (with Buddhu) V. 1. 1. Kutsa 1, 15, 1 to 5. 15, 8 to 16, 10. IX, 6, 1, 45 to 58. Kakshivat 1, 17, 1 to 18, 6. IX, 4, 7. Kanwa, 1, 1 to 8. IX. 5, 9. Medhátithi, 1, 4, 1 to 5, 4, and several hymns of the 8th book. Trisoka (from Kanwar family) VIII, 6, 3, 3. Usanas IX, 1, 4. 5, 2 to 4. Gotama I an. 13 to 14, and some parts of the 9th book Mudgala, son of Bhrimyaswás, is named as the author of X, 9, 3.

5. There is in the Library of the East India House and among Professor Wilson's books deposited in the Bodleyan Library at Oxford, a very extensive collection of these liturgical Sûtras, of which the greater number has not found a commentator. Those that I saw are the Sûtras of Aswaláyana, Apastamba, Drágháyana, Kátyáyana, Látyáyana, Sankhyáyana, Gobhila and Boudbháyana. Aswaláyana's Sûtras, with which I am best acquainted, appear, to judge only from



the great number of copies, to have been most extensively known. The first section of the same, the *Srautasútra*, consists of two parts of 6 *adhyāya* each, the second part, the *Grihyasútra*, is divided into four *adhyāya*. We have a commentary to this by *Nārāyana*, of which the East India House possesses at least the division for the first 6 sections of the *Srauta*, and for the *Grihyasútras*. *Aswalāyana's Sūtras* also refer to more ancient works, for instance to the *Aitareya Brāhmaṇa*, from which at several places pretty extensive extracts are given (even without mentioning the source) further to the *Kausītaka* and to ancient teachers, for instance *Kautsa*, *Gautama*, *Gāṇagāri*, *Taulvali*, *Sādyāyana*, *Saunaka*, etc.

6. In a similar way we shall be able on the other side to arrive at a determination of the mutual relation of the Vedic and Epic writings in respect of age and origin.

I confess that I have not yet been able to convince myself that the *Mahābhārata* even in respect of its fundamental component parts reached back into the Anti-Buddhist period. I have the same doubt in regard to the *Rāmāyana*. Before the founding of Buddhism, and contemporaneously with it, must be placed the era of Vedic authorship, in which—so to express myself,—the practical consequences were drawn from that treasure of the oldest theology, which is laid up in the hymns. This is the liturgical period to which the books belong which under the names of *Brāhmaṇa* and the like have come down to us. The priests fashioned the worship (*Cultus*) and the worship fashioned the priests. At that time the proper Veda, i. e. the hymns, were not indeed historically comprehended, but yet exactly known; people tried to understand them by the help of grammars and exegesis. One portion of the latter is the construction of legends (*itihāsa*, *ākhyāna*,) from the text of the hymns, and it must be confessed of these relations, that with the exception of those turns which have a liturgical aim, the most of them are confined within the limits of historical possibility, so far as this point can naturally come into question with the Indian.

But in both the Epic poems quite another aspect of things begins. The Veda is only imperfectly known; the ritual no longer struggles after development, it is complete; the Vedic legends have entirely detached themselves from their root; and quite a different worship has taken the place of the religion of *Agni*, *Indra*, *Mitra* and *Varuna*. The



last named fact specifically should most of all have demonstrative force. There runs through the whole of the Indian religious-life an historical sunderance,\* from the time of the Rámáyana down to the present day. The worship is Vedic, and indeed exclusively Vedic, while the religious view is turned to quite different forms. This second structure, the religion of Vishnu and Bráhmá, begins with the Epopees, and is thenceforth the only one which has retained vitality, but it has not had the strength to break down the walls of the Vedic institution, and form itself into a ritual in its room. Similar appearances, though less abrupt, will be shown by a scrupulous historical investigation in all the more important religious systems; the Grecian mysteries, e. g. will be seen to have their root in no other relation than that of the original and old, to the transformed and new; that in Egypt such new formations, and the simultaneous existence of various systems have occurred, is still less doubtful; and religious history might propose to itself for its theme, sunderance and separation far more than combination. Finally, there rules in the Puránas—I am not afraid to say it,—a complete misunderstanding of Vedic antiquity, and all that is connected therewith, a fundamental ignorance of the Vedic writings, on the origin and division of which so much is fabled. And for the explanation of that foretime they (the Puránas) will be useful far less immediately, than mediately, on this account that we accidentally meet again in the later tales, with results found elsewhere and independent of them, and are able gradually to form a standard to try the historical value of these legends.

Research into the historical relation of the Veda and the Epopees must keep these circumstances in view. The following appears to me to be a practicable mode of determining more nearly the interval of time which lies between the two. It is well known that the Anukramaniká very frequently gives short legends, solely with the object of illustrating the origin of the hymns. This happens more amply, and with the same view, in the Vrihaddevatá ascribed to Saunaka, a book composed in metre, of which I have been unable to discover any copy in England, but which in all probability will yet be found in India. The commentator of the Anukramaniká to the Rik, Shadgurusishya, knows this writing and cites it frequently, and Sáyana often gives longer

\* Zwiespalt; splitting into twain.

extracts from it in his commentary. More valuable still than these notices are indisputably those representations of the old tales, which we find in the Bráhmaṇas. The Aitareya Bráhmaṇa gives a considerable number of them, and among these most amply the history of Súnahsepha (VII. 13 to 18).<sup>\*</sup> Not less rich is the Taittiríya Saṁhitá, and to judge by citations,—the Kaushtaka, Táṇḍya, and other writings of this kind.

After this would come the task of following the progressive formation or even declension of the legends from their origin onward through all these branches and transformations, to determine from what source they have flowed into the Epopees, or—if no written source could be assumed for them—at what stage of development, the tale stood, when it passed into these poems. From the richness and variety of these narrations and the great number of writings which lie open to us for comparison, it should be possible to arrive at an approximative result. The chronological sequence of the preceding writings, of the discovery of which we certainly may not doubt, would then transmit to us downward from above the relative date for the origin of the epic books.

7. As a proof, that the authors of the Bráhmaṇa were acquainted with grammar as a science, may be considered the greater number of the derivations of words, belonging equally to etymology and grammar, by which those writings are corroborating their doctrines.

It may here suffice to quote one passage, in which a technical term of grammar is met with. It is taken from the Aitareya Bráhmaṇa, VII. 30.

Athásyaisha swa bhaksho, nyagrodhasyávarodhás cha phaláni chaudumbarány, áswattháni, plákshány abhishunúyát. táni bhakshayét, so ashya swo bhaksho. yato vá adhidéva yajnéśhtwá swargan lokam áyans tatraitáns chamasán nyubjans, té nyagrodhá abhavan, nyubjan iti hápy énáṁ étarhy áchakshaté Kuru kshétre téha prathamajan nyagrodhánán, tébhyo hánya 'dhijátas. te yan nyancho 'rohans, tasmán (nyán rohati nyagroha) nyagroho vai náma. tan nyagrohan santan nyagrodhan ity áchakshate parokshéṇa, paroksha-priyá iva hi déva : †

<sup>\*</sup> This remarkable legend bears, in the representation in the Bráhmaṇa, a peculiar stamp of antiquity. As the same tale is treated diffusely in the Rámáyana, is doubtless also related in the Mahábhárata, is found in the Puráṇas, and is also mentioned elsewhere, e. g. in Manu, it might supply a fit example to exhibit the mode in which legends are developed.

“The food proper for the Kishatriya, is the following. Let him extract out the produce of what is growing downward from the Nyagrodha, (i. e. of the stems which rise from the branches of the Banyan tree,) fixed in the ground, and the fruits of the Udumbara (*Ficus racemosa*) of the Aswattha (*Ficus Indica*), of the Plaksha (*Ficus infectoria*). All such let him eat; it is his proper food; for when the supreme gods after the performance of the sacrifice went to heaven, they upset their sacrificial vessels. Hence arose the Nyagrodha-trees. For this reason those trees are called upset (bent) in Kurukshétra (where the sacrifice took place) these were the primitive stems of the Nyagrodha, from these others were produced, which were called nyagrodha (growing downwards) because they were bent downward. The nyagrodha is called nyagrodha after the mysterious (etymology) for the gods like mystery.”

The last remark is repeated in the following chapter of the Bráhmaṇa, and frequently at other places. What is meant by the mysterious formation of a word, the paraksha formation, I will illustrate by a passage of the commentary to the Nirukta (ad. I. 1.) Durga says: trividhá hi sabda-vyavasthá, prathyaksha-vrittaya: paroksha vrittaya: atiparoksha-vrittayascha. tatroktakriyá: pratyaksha-vrittaya: antalína-kriya: paroksha-vrittaya: atiparoksha-vrittishu sabdéshu nirvachanábhyapáyas, tasmát paroksha-vrittítám ápadya pratyakshavritinā sabdéna nirvaktavyás. The example which was the occasion of Durga's remark, is the word nighañtu, nighañtavas, where he says, atiparoksha-vritti, nigantavyas is parokshavritti, and nigamayitáras is pratyaksha-vritti. One sees without difficulty, that the word paroksha in the meaning it has in the Bráhmaṇa, necessarily refers to the existence of that grammatical terminology which is explained by Durga.

8. Dévarāja in the commentary to the Naighantuka (pro. 1134, E. I. II. pol. I.) mentions the following names of persons to whom commentaries of the Védas (véda bháshyāṇi) are ascribed: Skanda-swámi (who after the same authority wrote a gloss to the Nirukta) Bhavaswámi, Guhadéva, Srinivása, Mádhavadéva Uvaṭṭa (otherwise Uvaṭa, of whom Colebrooke, Ess. I. 99, compare also p. 54, note, possessed fragments and who made commentaries to two Prátisakhya sútras, of which afterwards) Bhaṭṭa Bháskara Misra, Bharataswámi.



*Note to accompany a Chart of the Bay of Bengal, with the average courses of its Hurricanes from A. D. 1800 to 1846.*—BY HENRY PIDDINGTON.

This Chart is the third of a series now printing for a new work on Storms, which it is hoped will be for the Mariner in all parts of the world, what the “Horn Book of Storms” is for the Eastern Seas, from the Cape to China, and I have thought this chart of sufficient general scientific interest to offer copies of it to the Editors of the Journal.

It may be regarded both in a meteorological and a nautical point of view, and further as a contribution to general science, for to advert first to this last named view, it will not be thought trifling that we are now enabled to say by the researches of Mr. Redfield and Col. Reid for the Atlantic Ocean for 66 years (1780 to 1846) those of Col. Reid, Mr. Thom and my own for the Southern Indian Ocean for 35 years (1809 to 1846), my researches for the Bay of Bengal for 46 years, 1800 to 1846, and in the China Sea for 66 years, 1780 to 1846, and my researches over all the other portions of the globe wherever I could obtain documents, as the Pacific Ocean, coasts of Australia, &c. no contradiction to the great laws which Redfield and Reid have announced has been discovered, and this though every apparent anomaly has been subjected to the closest scrutiny! The researches too have been carried out to an extent which few are aware of, as both to the various sources referred to and their number. Hence we may look upon this Chart as part of the results of a series of registries of independent experiments recorded without the least concurrence on the part of the registrars,\* and this evidence of the clearest and highest order to the truth of a great physical law.

And this relates to the rotation of Storms. What we have now to pursue for separate seas and oceans, and what is in this chart accomplished is, the slow and gradual mapping of their various tracks as completely as it has been done in the West Indies and for the coasts of North America by Redfield and Reid, and for the Bay of Bengal and

\* The *experiment*, i. e. the storm, is made for us, but the seaman varies it by the different manœuvres he executes to get through it. On shore we sit still in our houses and register nothing more.



China Sea by myself; for without a knowledge of the average tracks the problem of the management of a vessel becomes much more intricate for the seaman; since it is upon the track of the Storm (as upon that of a pirate or enemy) that his manœuvres must depend, and this he must know or know how to calculate. Hence the importance of this chart in a nautical point of view.

There is one more relation in which I venture to present it, and that is the following. If we produce by the eye or a ruler the various tracks of the Storms backwards to the Eastward on the same line we shall find them all *tending* as it were, to some focus of volcanic action now in activity. Beginning from the South, the first set appear to come from some of the numerous Sumatran Volcanoes or of the Volcanic islands which fringe its coasts. The next set, and these are the most remarkable, will mostly be found to arise about Barren Island, which is a Volcano always in activity, and to run towards points between the West and N. N. W., while a third, the Dacca and Kyook Phyoo hurricanes seem traceable from the volcanic centres of Cheduba (or Chittagong.)

It is difficult to say that these coincidences are not more than accidental, but I shall best explain my general views on the subject by the following, copied from my forth-coming work, p. 19, par. 33 :—

“ Other suggestions have been thrown out and instances adduced by different writers as to the possibility of volcanoes, and even fires, originating violent circular motions of the atmosphere, and that volcanic eruptions are often accompanied by violent storms and heavy falls of rain, there is no doubt. I have myself pointed out, though my published Researches have hitherto been confined like those of Redfield and Reid to the effects, as the sure eventual index to guide us backward to the causes of Storms, that in the China Sea and Bay of Bengal\* there is much to countenance the idea that Storms in some parts of the world may originate at great volcanic centres, and I am inclined to believe also that their tracks are partly over the great internal chasms of our globe, by which perhaps the volcanic centres and bands communicate with each other. If we produce at both ends the line of the track of the great Cuba hurricane of 1844, we shall find that it extends from the great and highly active volcano of Cosseguina on the Pacific shore of central America to Hecla in Iceland! and in 1821 the breaking out of the great volcano of Eyafjeld Yokul in Iceland, which had been quiet since 1612, was followed all over Europe by dreadful storms of wind, hail and rain. In Iceland the

\* Sixth Memoir, Storms of the China Sea, Journal Asiatic Society, Vol. XI. p. 717.

# References

The Roman numerals refer to those numbers of my Memoirs in the Journal of the Asiatic Society of Bengal in which the Storms of this part of the world are investigated

The Italic letters refer to Storms for which I have data but which are yet unpublished

|                          |                       |                     |                       |
|--------------------------|-----------------------|---------------------|-----------------------|
| a. Onago Hurricane       | Oct <sup>r</sup> 1800 | i London            | Oct <sup>r</sup> 1852 |
| b. HMS Centurion         | Dec <sup>r</sup> 1803 | j Duke of York      | May 1853              |
| c. Sharnas               | Jun <sup>r</sup> 1805 | k Calcutta          | Aug <sup>r</sup> 1854 |
| d. ...                   | May 1811              | l Madras            | Oct <sup>r</sup> 1856 |
| e. ...                   | Mar 1820              | m Protector         | Oct <sup>r</sup> 1858 |
| f. Hurricane & Backhunge | June 1822             | n Ayon              |                       |
| g. ...                   | May 1825              | o Myeok Phyeo Syren |                       |
| h. ...                   | Oct <sup>r</sup> 1831 | p and ...           |                       |

111 June 1841

II 2 Nov 1859

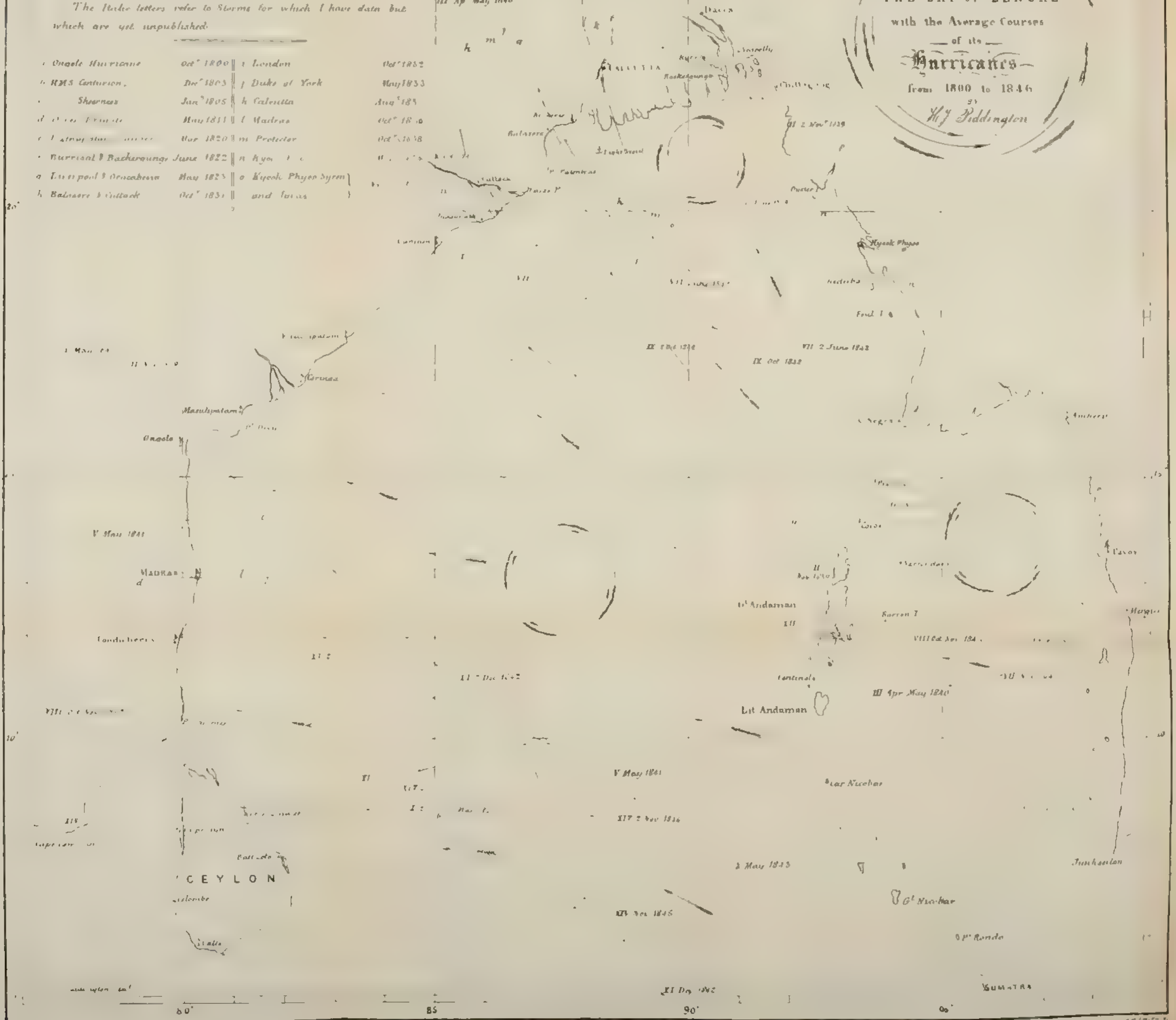
III Apr May 1840

Chart: III

THE BAY OF BENGAL  
with the Average Courses  
of its  
Hurricanes

from 1800 to 1846

W. J. Piddington





Barometer fell from the day before the eruption till the twenty-sixth day after.\* Mr. Espy quotes several other cases, and Humboldt for South America, to show that nothing is better established than the fact of the connection of volcanoes with rains and storms. Purdy (*Atlantic Memoir*) also alludes to the supposed focus of sub-marine volcanic action on the Equator, in that sea, as the spot to which the southern extremes of the West Indian hurricane tracks would tend, if continued. If I advert to these speculations it is with the hope of drawing the attention of intelligent mariners to them."

\* Espy, p. 67, 68, not correctly printed.

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*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of July, 1847.*

| Days of the Month. | Maximum Pressure observed at 9h 50m. |                |             |              |                        | Aspect of the Sky.   | Minimum Pressure observed at 4 p. m. |                |             |              |                                | Wind.             | Aspect of the Sky. | Maximum Temperature. | Rain Gauges.<br>Elevation.<br>Feet Feet<br>Upper Lower<br>40 4 | Moon's phases. |
|--------------------|--------------------------------------|----------------|-------------|--------------|------------------------|----------------------|--------------------------------------|----------------|-------------|--------------|--------------------------------|-------------------|--------------------|----------------------|----------------------------------------------------------------|----------------|
|                    | Barometer reduced to 32° Fahrenheit. | Of the Mercur. | Of the Air. | Of Wet Bulb. | Direction from sunnsh. |                      | Barometer reduced to 32° Fahrenheit. | Of the Mercur. | Of the Air. | Of Wet Bulb. | Direction from 2.40 to 4 p. m. |                   |                    |                      |                                                                |                |
| 1                  | In. 29.554                           | 84.8           | 84.0        | 80.8         | S. E.                  | Cloudy.              | In. 29.436                           | 88.0           | 85.0        | 80.0         | S. E.                          | Cumulo strati.    | 91.0               | 1.37                 | 1.50                                                           |                |
| 2                  | 462                                  | 89.0           | 86.0        | 81.5         | S.                     | Cumulo strati.       | 406                                  | 86.0           | 80.5        | 79.4         | S. E.                          | Rain.             | 91.4               | 1.92                 | 2.10                                                           |                |
| 3                  | 471                                  | 87.3           | 86.1        | 82.0         | S.                     | Cloudy.              | 395                                  | 87.0           | 86.0        | 81.0         | S.                             | Cumulo strati.    | 91.6               | 0.35                 | 0.43                                                           |                |
| 4                  | 556                                  | 80.5           | 80.9        | 77.8         | S.                     | Cloudy.              | 499                                  | 83.0           | 83.0        | 78.4         | S. E.                          | Cloudy.           | 84.0               | ..                   | ..                                                             |                |
| 5                  | 651                                  | 82.5           | 81.5        | 77.0         | E.                     | Cloudy.              | 572                                  | 88.5           | 86.5        | 80.0         | S.                             | Cloudy.           | 89.6               | ..                   | ..                                                             |                |
| 6                  | 662                                  | 89.0           | 87.8        | 80.2         | S.                     | Cumulo strati.       | 555                                  | 94.0           | 91.5        | 81.0         | S.                             | Cumulo.           | 94.3               | ..                   | ..                                                             |                |
| 7                  | 587                                  | 89.0           | 88.0        | 81.0         | S.                     | Cumuli.              | 465                                  | 91.4           | 90.6        | 82.0         | S.                             | Cirro strati.     | 94.2               | ..                   | ..                                                             |                |
| 8                  | 523                                  | 89.0           | 87.5        | 81.0         | S. W.                  | Cloudy.              | 400                                  | 94.5           | 92.0        | 83.2         | S. W.                          | Very cloudy.      | 95.9               | 0.20                 | 0.27                                                           |                |
| 9                  | 517                                  | 85.0           | 85.6        | 82.0         | S.                     | Cloudy.              | 421                                  | 89.5           | 88.5        | 82.6         | S.                             | Cloudy.           | 89.6               | 0.68                 | 0.74                                                           |                |
| 10                 | 485                                  | 85.8           | 85.0        | 80.4         | S. W.                  | Cloudy.              | 430                                  | 78.0           | 79.0        | 77.3         | N. E.                          | Drizzly.          | 89.0               | 2.99                 | 3.09                                                           |                |
| 11                 | 485                                  | 88.5           | 87.0        | 82.0         | N. E.                  | Cloudy.              | 400                                  | 91.7           | 89.2        | 82.2         | S. E.                          | Cloudy.           | 99.2               | 0.22                 | 0.29                                                           |                |
| 12                 | 517                                  | 87.0           | 87.0        | 82.0         | N. E.                  | Cloudy               | 417                                  | 89.5           | 88.0        | 82.3         | N. E.                          | Cloudy.           | 91.4               | 0.78                 | 0.87                                                           |                |
| 13                 | 485                                  | 81.0           | 81.4        | 80.8         | S. W.                  | Cloudy Cirro-Cumuli. | 420                                  | 87.0           | 86.9        | 82.0         | W.                             | Cloudy.           | 87.2               | 0.21                 | 0.27                                                           |                |
| 14                 | 519                                  | 87.0           | 85.8        | 80.8         | S.                     | Rain.                | 421                                  | 89.8           | 88.2        | 81.4         | S.                             | Cumulo strati.    | 91.4               | 0.05                 | 0.06                                                           |                |
| 15                 | 479                                  | 86.8           | 86.0        | 82.0         | S.                     | Nimbi.               | 392                                  | 86.5           | 86.1        | 82.8         | S. E.                          | Cloudy.           | 91.0               | 0.52                 | 0.62                                                           |                |
| 16                 | 518                                  | 84.5           | 84.9        | 79.8         | N.                     | Cloudy.              | 445                                  | 86.8           | 86.0        | 80.8         | S.                             | Cloudy.           | 85.8               | ..                   | ..                                                             |                |
| 17                 | 628                                  | 85.6           | 84.0        | 80.0         | S.                     | Cloudy.              | 570                                  | 86.0           | 86.0        | 79.0         | S.                             | Cloudy.           | 87.8               | ..                   | ..                                                             |                |
| 18                 | 696                                  | 88.0           | 87.6        | 80.0         | S.                     | Cumuli.              | 606                                  | 90.0           | 88.5        | 80.2         | S.                             | Cumulo strati.    | 91.4               | ..                   | ..                                                             |                |
| 19                 | 669                                  | 87.0           | 86.6        | 80.5         | S.                     | Cumuli.              | 577                                  | 87.0           | 86.8        | 80.3         | S.                             | Cloudy.           | 90.0               | 0.70                 | 0.76                                                           |                |
| 20                 | 685                                  | 81.8           | 82.0        | 80.0         | S.                     | Drizzly.             | 565                                  | 84.3           | 84.4        | 79.9         | S.                             | Cloudy.           | 87.0               | 1.55                 | 1.64                                                           |                |
| 21                 | 688                                  | 87.0           | 85.9        | 79.8         | S.                     | Cirro Cumuli.        | 563                                  | 89.9           | 89.0        | 81.0         | S.                             | Cumulo strati.    | 90.4               | 1.66                 | 1.76                                                           |                |
| 22                 | 603                                  | 90.2           | 87.8        | 81.8         | S.                     | Cumulo strati.       | 466                                  | 95.7           | 89.4        | 82.1         | S.                             | Cloudy.           | 91.9               | 0.33                 | 0.40                                                           |                |
| 23                 | 579                                  | 85.8           | 84.9        | 80.7         | S.                     | Cloudy.              | 493                                  | 88.0           | 86.9        | 82.0         | S.                             | Cloudy.           | 89.4               | 0.33                 | 0.40                                                           |                |
| 24                 | 612                                  | 83.1           | 82.8        | 79.2         | S.                     | Nimbi.               | 534                                  | 81.5           | 81.8        | 79.0         | S. E.                          | Nimbi.            | 87.9               | 0.18                 | 0.23                                                           |                |
| 25                 | 613                                  | 89.0           | 87.0        | 80.0         | S. E.                  | Cumulo strati.       | 534                                  | 87.0           | 85.0        | 80.5         | S. E.                          | Cumulo strati.    | 86.4               | 0.24                 | 0.34                                                           |                |
| 26                 | 635                                  | 90.5           | 89.0        | 81.9         | E.                     | Ditto.               | 551                                  | 87.0           | 83.7        | 79.0         | S. E.                          | Rain, thundering. | 86.4               | ..                   | ..                                                             |                |
| 27                 | 647                                  | 89.4           | 86.2        | 79.8         | S. E.                  | Ditto.               | 582                                  | 91.0           | 89.2        | 81.5         | S. E.                          | Cumulo strati.    | 91.1               | 0.12                 | 0.19                                                           |                |
| 28                 | 708                                  | 90.5           | 87.5        | 80.7         | S. E.                  | Ditto.               | 623                                  | 89.0           | 87.9        | 81.0         | S. E.                          | Cumulo strati.    | 91.1               | 0.07                 | 0.13                                                           |                |
| 29                 | 725                                  | 88.5           | 88.0        | 81.8         | S.                     | Ditto.               | 626                                  | 91.0           | 89.5        | 81.8         | S.                             | Cumulo strati.    | 90.4               | ..                   | ..                                                             |                |
| 30                 | 710                                  | 90.0           | 88.4        | 81.4         | S. W.                  | Ditto.               | 593                                  | 90.5           | 90.2        | 81.3         | S.                             | Cloudy.           | 92.5               | ..                   | ..                                                             |                |
| 31                 | 639                                  | 88.5           | 88.2        | 81.9         | S.                     | Ditto.               | 523                                  | 90.5           | 90.0        | 83.0         | S.                             | Cumulo strati.    | 92.8               | ..                   | ..                                                             |                |
| Mean               | 29.591                               | 86.8           | 85.8        | 81.9         |                        |                      | 29.500                               | 88.3           | 86.9        | 80.8         |                                | Cirro strati.     | 93.8               | 14.14                | 15.69                                                          |                |

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY, 1847.

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The usual monthly meeting of the Asiatic Society was held on Wednesday evening, the 7th July, 1847.

Sir J. P. GRANT, *Vice-President*, in the chair.

The minutes of proceedings of the last meeting were read and adopted, and the accounts and vouchers for June laid on the table.

*E. Currie, Esq.*, C. S. duly proposed and seconded at the June meeting, was ballotted for and elected a member.

The following gentlemen were named as candidates for election at next meeting:—

*Capt. J. D. Cunningham*, proposed by J. W. Laidlay, Esq., seconded by Col. Forbes.

*J. Beckwith, Esq.*, proposed by W. P. Grant, Esq., seconded by Sir J. P. Grant and Col. Forbes.

*William Greenway, Esq.*, Assay Master, Agra, proposed by Col. Forbes, seconded by Dr. W. B. O'Shaughnessy.

Read letters from—

The Secretary to the Military Board, forwarding a communication from the Agricultural and Horticultural Society on the timber trees of Bengal, (referred to Capt. Munro, who is entrusted with the preparation of a Report on this subject on behalf of the Society.)

From Mr. Muir, forwarding his translation from the German of Dr. Rudolph Roth's preliminary Essay on the literature and history of the Vedas.

From Mr. James Corcoran, submitting a specimen of his Urdu History of the Chinese Empire, and requesting the Society's patronage of the work. (Referred to the Committee of Papers.)

From the Royal Academy of Munich, presenting several works and requesting others in exchange. (Referred to Librarian for Report.)

From Capt. J. D. Cunningham, giving a detailed description of his antiquarian researches during a tour of the districts within the Bhopal Agency.

From Mr. Wattenbach, of Bombay, tendering his resignation as a member of the Asiatic Society, in consequence of his having joined that of Bombay.

From M. T. Fournier, of Cachar, requesting the aid of the Society in the promotion of his researches in natural history, and tendering apparently on sale a "green Serpent," for which he understood the Society had offered "*une belle recompense*."—(Referred to the Committee of Papers.)

From Mr. Ward, presenting a very curious specimen of the growth of *Confervæ* in vinegar.

From Mr. Laidlay, submitting an Essay by Dr. Cantor on the serpents of the Malayan Peninsula.

The Committee of Papers submitted for the decision of the Society,

1.—A proposition from the Senior Secretary, that he be allowed to vacate the Secretaryship to the Meteorological Section, and that Capt. Thuillier, the Officiating Deputy Surveyor General, be appointed in his stead. This proposal was unanimously supported by the Committee on the grounds advanced by the Senior Secretary—the active exertions Capt. Thuillier has made to enable the Society to resume the publication of a Meteorological Register, which is kept with the best instruments in India and by experienced observers, in the Surveyor General's office. Capt. Thuillier's consent had been given to the nomination. (Unanimously approved.)

2.—The probationary period of six months for which the Librarian, Rajendra Lal Mittra had been employed having expired, and his duties having been discharged to the entire satisfaction of the Committee, they recommend his being permanently appointed Librarian to the Society. (Unanimously adopted.)

3.—The Committee communicated correspondence and accounts regarding the outlay on the "Cantor Drawings."

The questions placed before the Society by Circular to the resident members, (subsequent to the last meeting,) regarding Sir Alexander Burnes' Drawings and Mr. Blyth's claim for Rs. 3,200, were brought up and discussed.

## (CIRCULAR.)

## ASIATIC SOCIETY, ZOOLOGICAL DEPARTMENT.

The Vice-Presidents and Committee of Papers of the Asiatic Society deem it their duty to circulate for the information of the resident members the annexed documents regarding the printing of coloured lithographs of the drawings of the "*Zoology of the Indus*," made under the directions of the late Sir Alexander Burnes and Dr. Lord, and placed at the disposal of the Society by the Supreme Government of India, in 1838.

The original drawings were 146, of which up to October 1846 there had been lithographed and coloured 51—lithographed but not coloured 13—for which there had been paid or remained due Co.'s Rs. 5,797 10 6, for copying, paper, colouring, and printing.—The Committee of Papers with reference to the state of the Society's finances when this account was laid before them, considered it their duty to discontinue any further outlay on the proposed publication, and their recommendation to this effect was unanimously approved of at the January and February meetings of 1847.

The question remained open for consideration how the plates already completed were to be disposed of. No description of the plates was available, the original MS. by Dr. Lord, entrusted to Mr. Blyth in 1842, having been lost by that officer, who had undertaken to supply its place by adequate letter-press by himself. In consideration of this promise and to accelerate its performance, with reference also to his zealous exertions in increasing the Society's collections, the Society (as stated by Messrs. Torrens, Heatly and Frith) at the general meeting of May 1844, undertook to make an addition from that date of 100 Rs. per mensem to Mr. Blyth's salary, payable with all arrears, on the completion of the MS. Of this resolution there is no official record, but on the evidence of the gentlemen above named it was renewed and officially recorded at the general meeting of November, 1846.—The meeting further resolved that the addition to Mr. Blyth's salary could not have effect beyond the 31st of December, 1846, by which time Mr. Blyth would have a claim on the Society of Rs. 3,200, payable on the completion of the promised letter-press.

On the 20th of May, 1847, the Secretaries received Mr. Blyth's letter-



press notes on the 64 plates, and these notes with the plates were immediately submitted to the "Zoological Section," appointed in February 1847, and composed of Capt. William Munro, J. W. Grant, Esq., R. W. G. Frith, Esq., and J. W. Laidlay, Esq. These gentlemen were requested to advise the Committee as to the mode of publication of the plates and MS. and as to the amount of remuneration due to Mr. Blyth.

The Zoological Section have formally reported their opinion, that the plates are "unworthy of publication under the auspices of the Society, being in many instances so rudely executed that it is scarcely possible to identify the animals they profess to represent, while in most others, whether regarded as works of science or of art, they fall far below that standard to which the Society's patronage should be extended;" regarding the amount of remuneration to Mr. Blyth, the "Zoological Section" observe that "while they regret that the funds of the Society should be expended so uselessly, they are unanimously of opinion that whatever the Society has promised should be fulfilled."

Fully adopting these views the Committee of Papers deem it necessary by republication of all the requisite documents, to enable the members of the Society to decide, 1st, as to the publication or suppression of the plates, and 2dly, as to the actual nature of the promise made to Mr. Blyth, the conditions under which that promise was accepted by Mr. Blyth—and the manner in which these conditions have been fulfilled on his part.

The Committee are of opinion that the plates should not be published, but that members desiring to be supplied with a set may have them on paying the cost of binding. While the Committee would not oppose the payment of Mr. Blyth's claim if made exclusively on the grounds of his general services to the Society during the period in question, they cannot on the other hand advise that a sum of 3,200 Rs. should be paid for the scanty and unsatisfactory MS. placed at their disposal after a period of four years from the time when Mr. Blyth was first instructed to edit Dr. Lord's manuscript. The questions above stated will be submitted to the decision of the resident members of the Society at the regular monthly meeting to be held on the 7th of July.

W. B. O'SHAUGHNESSY,

*Asiatic Society, 15th June, 1847.*

*Sen. Secretary.*

## REPORT OF THE ZOOLOGICAL SECTION WITH CORRESPONDENCE AND MINUTES OF MEMBERS.

*Committee of Papers, Asiatic Society, 25th May, 1847.*

The Senior Secretary begs leave to circulate a letter from the curator, Mr. Blyth, forwarding brief MS. notes on the "Burnes" drawings already lithographed, about one half of the series in the Society's possession.

The Society are pledged to pay Mr. Blyth the sum of 3,200 Rs. on his completion of letter-press for the drawings. The Senior Secretary, with reference to this obligation, proposes that Mr. B.'s MS. be referred to the Section of Zoology and Natural History, for their advice as to the mode of publication and the amount of payment to be awarded to Mr. Blyth.

To W. B. O'SHAUGHNESSY, ESQ.

*Senior Secretary of the Asiatic Society.*

SIR,—I have the pleasure to forward you a series of the lithographs that have been executed of the late Sir Alexander Burnes' drawings of animals, with the letter-press to accompany their publication. It has not been possible to determine, in every instance, with certainty the precise species to which they refer, but I have spared no pains nor labour to arrive at the results embodied in my MS.

I have the honor to be, Sir,

Very obediently your's,

E. BLYTH.

*As. So. Museum, May 20, 1847.*

To Dr. W. B. O'SHAUGHNESSY,

*Senior Secretary Asiatic Society.*

SIR,—I have the honor to inform you that the "Burnes" Lithographs with Mr. Blyth's annotations, have been circulated to the members of the Section of Natural History for their opinion regarding the propriety of publishing the same, and the amount of remuneration due to Mr. Blyth.

2. You will see from the accompanying minutes that the Section has bestowed much attention upon the first of these points; and the members are unanimously of opinion that the drawings are unworthy of publication under the auspices of the Society, being in many instances so rudely executed that it is scarcely possible to identify the animals they profess to represent, while in most others, whether regarded as

works of science or of art, they fall far below that standard to which the Society's patronage should be extended.

3. As to the other question,—the amount of remuneration due to Mr. Blyth,—while they regret that the funds of the Society should be expended so uselessly, the members of the Section are equally unanimous in their opinion, that whatever the Society has promised should be fulfilled.

I am, Sir,

Your obedient Servant,

5th June, 1847.

J. W. LAIDLAY.

To Capt. MUNRO, J. W. GRANT, ESQ. R. W. G. FRITH, ESQ.

*Members of the Zoological Section, Asiatic Society.*

GENTLEMEN,—In compliance with the instructions of the Committee of Papers, I beg to circulate the accompanying portfolio of the "Burnes" Lithographs, and to solicit your opinions as to the mode of publication and the amount of remuneration due to Mr. Blyth for his annotations.

2. As to the former point, although these drawings are for the most part of very insignificant value for the purposes of science, and therefore not likely to extend the reputation of the Asiatic Society; yet if in your opinion publication be desirable, the cost of the letter-press, in addition to the very heavy expense already incurred for the drawings, would be very trifling, and even in the present embarrassed state of the Society's finances need not form any obstacle to the fulfilment of your wishes in that respect.

3. Regarding the second point; Mr. Blyth's remuneration was fixed by the Society at Co.'s Rs. 3,200, and it appears to me beyond our province to interfere in any way with its amount; although it rests with the Committee to determine whether the work required has been done or not.

I have the honor to be, Gentlemen,

Your obedient Servant,

Calcutta, 25th May, 1847.

J. W. LAIDLAY, *Secretary.*

I have carefully examined the accompanying portfolio of drawings and the MS. notes which are attached to each—I trust the Society will not in any way authorize the publication of these very bad and useless drawings, which can only entail ridicule on any scientific body giving them a place in their transactions. For instance, Plate 22 represents a Lark sitting in a tree. Plate 19 represents a Kingfisher with four toes in front of the foot instead of one behind and three very unequal ones in front.

With most of the Mammalia I am personally well acquainted and can confidently say that not one figure is even a fair representation of the animal

intended, and nothing can be more ridiculous than the drawings of the Hyena, the white Weazle, the little Alactaja or Jerboa? so common about Ferozepore, and the Hogdeer. In the long legs and upturned spur it is difficult to recognise the superb Minal; and the graceful Coolon so common on the banks of the Ganges is most unjustly represented by a comparative short-legged bird in plate 28. Similar remarks might be applied to most of the drawings.

With regard to the remuneration to Mr. Blyth for his notes, I am not aware on what terms it was promised, but am of opinion that we should keep most faithfully all promises.

All that seems to have been done consists in guessing at the names of a number of animals, intended to be represented, in a series of bad drawings, with scarcely any original information regarding these animals. The little that has been done has been but slovenly executed, considering a large and distinct remuneration is expected. I will however particularize.

The name of Plate II. Fig. 3, can at best be but a guess, for the description of the animal does not at all agree with the account of its color, &c. as given in the 10th Volume of the Annals and Mag. Nat. History.—Plate IV. Fig. 2. has no trouble taken with it although it is supposed to be a new species.

Mr. B. wishes to make a new species from Plates VI. and VII. without assigning any reasons for doing so, except that *Sciuroptecis fimbriatus*, Gray, does not exceed 1½ ft. in length, whereas this squirrel is stated to be 2 ft. long. In a very recent work by Schinz on Mammalia, *S. fimbriatus*, under the name of *Pteromys fimbriatus*, is stated to be 1 ft. and 11 in. in length, leaving thus 1 inch difference, perhaps accidental in measuring, to cause the creation of a new species.

Plates VIII. and IX. are labelled with the same native names, as male and female, and no reason is given for assigning different names to the two. The Sikeen of the Himalayas is a very different looking animal from the one represented in Plate VIII. Mr. B., in his notes lays great stress on the presence of a beard, without stating that several other species closely allied have a beard as *Capra Œgagrus*, Himalayana, Falconeri, and the Neilgherry Ibex. In a letter from Mr. Blyth read at a meeting of the Zoological Society on 10th August, 1841 he speaks of the Neilgherry Ibex “as having a considerable beard and thus differing from the Himalayan Ibex.” Schinz mentions the male of *Capra Himalayana*, Blyth, as being called Sikeen and the female Damnah. He also mentions *C. Falconeri* as being the Narkhor of Vigne and Lord. Some of these discrepancies might have been explained away, if Mr. B. had zealously undertaken an essay on the animals of Afghanistan and neighbouring countries.

There are also several other indications of haste and carelessness; thus



Gmelin not Pallas is the authority for *Capra Œgagrus*. *Grus* was not a genus, nor *Ardea cinerea*, a species of Linnæus.

Dr. M'Clelland has already in the 2d volume of the *Calcutta Journal of Natural History* described several Affghan fishes from the late Dr. Griffith's collection, and to Dr. M'C. apparently Mr. Blyth is indebted for the short notes attached to this portion of the drawings.

The names of the snakes have been guessed at in a most hap-hazard way. Thus Pl. XLI. fig. 1, though bad enough to favour any guess is not an *Achrochordus*, but most probably *Boa Johnii*. (Russell, Plate 16) called by Schlegel *Portrya Eryx*. What possible reason can there be for supposing Plate XLII. fig. 2, to be the young of the one just referred to? Neither Plates XLIII. nor XLIV. fig. 4 are *Dipsas*, which is a genus of tree snakes only with large eyes and long, oval, or vertically contracted pupils. Plate XLVII. is most likely *Coluber anastomosatus*, Daudin.

With reference to a remark stated to have been made by Dr. Cantor approving of these lithographs, I am informed by that gentleman that the only two he had seen at the time he made the remark (1842) were two fishes, Plates XLVIII. and XLIX. which he thinks are good drawings.

WILLIAM MUNRO.

*Fort William, May 28th, 1847.*

I agree with Capt. Munro that these drawings are not worth publishing; the greater part of them are so bad that we might be pretty certain they never could be like the animals they are intended to represent, even if we had not the testimony of Captain Munro to the fact. As to the remuneration to be given for describing them, whatever has been promised must of course be fulfilled, but it is very annoying to see the funds of the Society expended so uselessly.

*31st May, 1847.*

J. W. GRANT.

I certainly cannot recommend the publication of such *trash* as these Burnes' drawings are. I believe there is little if any thing new amongst them, and if there be, it is almost impossible to identify their affinities, so wretchedly bad and incorrect are the figures. The fish are bad also, with fins and forms not belonging to them, and no attention paid to the number of rays in them. Consequently the difficulty Mr. Blyth has experienced in attempting to identify them has been very great, and I am sure much more could not have been done by him or any one else. Regarding the remuneration to Mr. Blyth, I am a witness to the fact of its having been promised to him, and I cannot for a moment understand how there can be the slightest question about its being granted to him. He is certainly entitled to it fully.

R. W. G. FRITH.

*Statement of Disbursements on account of Sir A. Burnes' Drawings.*

|                                                                                                     |                                          |    |   |   |
|-----------------------------------------------------------------------------------------------------|------------------------------------------|----|---|---|
| Jan. 3d, 1842, No. I.—Paid Mr. J. Bennett for Lithographing Sir A. Burnes' drawings, .....          | 250                                      | 0  | 0 |   |
| Feb. 14th, No. 9.—Mrs. Ballin for publishing Sir A. Burnes' drawings,.....                          | 500                                      | 0  | 0 |   |
| March.—Messrs. Rushton and Co. for paper on account of Sir A. Burnes' drawings, .....               | 48                                       | 6  | 6 |   |
| April 2d, No. 23.—Messrs. W. Rushton and Co. for 3 Reams of best Royal Paper,.....                  | 84                                       | 0  | 0 |   |
| April 15th, No. 31,—Ditto for 6 Reams of Plate paper at 28 per Ream,.....                           | 168                                      | 0  | 0 |   |
| Less 8 per Cent. for 3 months,.....                                                                 | 3                                        | 5  | 9 |   |
|                                                                                                     | 164                                      | 10 | 3 |   |
| April 22d, No. 34.—Mr. Ballin on account of Sir A. Burnes' drawings being balance of Account, ..... | 132                                      | 10 | 0 |   |
| April 25th, Nos. 37, 38.—Mr. J. Bennett on Account of Sir A. Burnes' drawings, .....                | 100                                      | 0  | 0 |   |
|                                                                                                     | 481                                      | 4  | 3 |   |
| June 29th, No. 58.—Mrs. Ballin as advance on account of Sir A. Burnes' drawings,.....               | 1000                                     | 0  |   |   |
| July 12th, No. 67.—Ditto ditto ditto ditto.....                                                     | 500                                      | 0  | 0 |   |
| Aug. 3d, No. 77.—Messrs. W. Rushton and Co. for 6 Reams of drawing paper, .....                     | 168                                      | 0  | 0 |   |
| Aug. 23d, No. 84.—Mr. J. Bennett on account of Sir A. Burnes' drawings, .....                       | 100                                      | 0  | 0 |   |
|                                                                                                     | 268                                      | 0  | 0 |   |
| Oct. 1st, No. 92.—Ditto on account of Lithographing Sir A. Burnes' drawings, .....                  | 100                                      | 0  | 0 |   |
| Dec. 1st, No. 113.—Ditto on account of Sir A. Burnes' drawings,.....                                | 100                                      | 0  | 0 |   |
| Dec. 5th, No. 129.—Messrs. W. Rushton and Co. for 6 Reams of Plate paper, .....                     | 168                                      | 0  | 0 |   |
| April 27th, No. 39.—Do. for $\frac{1}{2}$ Ream of fine foolscap, .....                              | 4                                        | 0  | 0 |   |
|                                                                                                     | $\frac{1}{4}$ Do. of Letter paper, ..... | 4  | 0 | 0 |
|                                                                                                     | 1 Dozen blacklead Pencils, .....         | 3  | 0 | 0 |
|                                                                                                     | 10                                       | 0  | 0 |   |
| Dec. 19th, No. 123.—Mrs. Ballin for 500 Receipts including paper, .....                             | 12                                       | 8  | 0 |   |
|                                                                                                     | 3,438                                    | 2  | 9 |   |
| Deduct amount of the last two bills being not on account of Burnes' drawings,.....                  | 22                                       | 8  | 0 |   |
|                                                                                                     | 3415                                     | 10 | 9 |   |

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|                                                                                                                    |                 |       |      |
|--------------------------------------------------------------------------------------------------------------------|-----------------|-------|------|
| Jan. 11th, 1843, No. 131.—Mr. J. Bennett on account of Burnes' drawings, .....                                     | 100             | 0     | 0    |
| April 18th, No. 166.—Messrs. W. Rushton and Co. for 2 Reams 3 Quires and 6 sheets of Plate paper, .....            | 60              | 8     | 9    |
| No. 170.—Mr. J. Bennett on account of Sir A. Burnes' drawings, .....                                               | 100             | 0     | 0    |
| April 23d, No. 173.—Bissonath Banerjee for 1 Ream of drawing paper on account of Sir A. Burnes' drawings, .....    | 25              | 0     | 0    |
| May 5th, No. 176.—Ditto for 2 Reams of drawing paper for Sir A. Burnes' drawings, .....                            | 45              | 0     | 0    |
| June 23d, No. 196.—Ditto for 1 Ream of ditto ditto ditto.....                                                      | 22              | 8     | 0    |
| No. 196½.—Ditto for 2 Reams of ditto ditto ditto .....                                                             | 50              | 0     | 0    |
| July, No. 202.—Ditto for 1 Ream of ditto ditto ditto. ....                                                         | 22              | 8     | 0    |
|                                                                                                                    | 425             | 8     | 9    |
| Deduct Discount on Bill No. 173 erroneously charged, .....                                                         | 2               | 8     | 0    |
|                                                                                                                    |                 | 423   | 0 9  |
| Feb. 6th, 1844, No. 337.—Paid Mr. J. Bennett amount being the balance on account of Sir A. Burnes' drawings, ..... | 18              | 0     | 0    |
|                                                                                                                    |                 | 18    | 0 0  |
| Dec. 17th, 1845, No. 687.—Paid Mrs. Ballin amount being balance on account of Sir A. Burnes' drawings,.....        | 68              | 4     | 0    |
|                                                                                                                    |                 | 68    | 4 0  |
| Jan. 29th, 1846, No. 707.—Paid Mrs. Ballin for Lithographing and Colouring as per Bill, .....                      | 261             | 6     | 0    |
| July 21st, No. 815.—Ditto for Printing and Colouring as per Bill,.....                                             | 261             | 6     | 0    |
| Sept. 12th, No. 838.—* Ditto for ditto.....                                                                        | 348             | 0     | 0    |
|                                                                                                                    |                 | 870   | 12 0 |
| Jan. 18th, 1847, No. 8.—Paid* Mrs. Ballin for Printing and Colouring as per Bill, .....                            | 519             | 11    | 0    |
|                                                                                                                    |                 | 519   | 11 0 |
|                                                                                                                    | Co.'s Rupees,.. | 5,315 | 6 6  |
| May, 19th.—Paid* Mrs. Ballin for Printing and Colouring as per Bill,.....                                          |                 | 482   | 4 0  |
|                                                                                                                    | Co.'s Rupees,.. | 5797  | 10 6 |

*Calcutta, Asiatic Society, the 20th March, 1847.*

\* All these payments have been made for work ordered and in progress previous to the resolution of the Committee to discontinue all expenditure on this account.—SECRETARY'S NOTE.

The above circular and reports having been read, and the subject commented upon in detail by Sir J. P. Grant, Col. Forbes, Mr. W. P. Grant, Mr. Welby Jackson, Mr. Blyth, Capt. Munro, and Dr. W. B. O'Shaughnessy, it was unanimously decided :—

1.—That the plates be not published, but that copies be supplied to any member applying for them.

2.—That Mr. Blyth's claim be paid in full in consideration of his general services to the Society during the period concerned, and without reference to his MS. for the Burnes' drawings.

3.—That the Senior Secretary be authorized to sell off Company's Paper to pay Mr. Blyth's demand.

The Committee of Papers having received a communication from Mr. Piddington, with a postscript by Mr. Torrens, regarding the expenses incurred by the lithographing of the Chusan Zoological drawings by Dr. Cantor, the Senior Secretary was proceeding, by direction of the Committee, to read Mr. Piddington's letter when that gentleman objected to its being brought forward. The subjoined Report by the Committee was then read :—

The Committee of Papers beg leave to submit to the Society a communication from Mr. Piddington, dated the 19th June, from which, they have been for the first time led to infer that a portion of the outlay on account of the "Cantor drawings," viz. Co.'s Rs. 2,300, might have been in *advances* for future work, and not solely for the 12 plates finished by Mr. Bennett, up to July 1846.

After repeated applications to Mr. Bennett, the Committee have at length ascertained that Mr. Bennett undertook to execute coloured plates of the whole of Dr. Cantor's drawings for the sum of Rupees 4,174. All expenses included.

The original drawings form a portfolio (bound) of 88 pages of sketches, which could be conveniently lithographed in 61 4to. plates.

Of the 88 pages, 13, containing the subjects for 12 plates, were delivered to Mr. Bennett and lithographed and coloured by him, being one-fifth of the number of plates he agreed to complete for Rs. 4,174.

Advances were made to Mr. Bennett (see account) during the progress of these 12 plates, to the amount of Rs. 2,300 ; of these advances 1,700 Rs. were paid on the order of Mr. Piddington, countersigned by Mr. Torrens, between the 9th June 1844, and 23rd December 1845, and Rs. 600, on the order of Mr. Torrens alone from 20th April 1846, to 26th October 1846. Total Rs. 2,300.



Mr. Bennett's actual charge for the 12 plates completed during that time is Rs. 785. No more of the original drawings having been delivered to Mr. Bennett, he is accordingly indebted to the Society, on this account, to the amount of Rs. 1,515.

In answer to an application on the part of the Committee of Papers, Mr. Bennett has consented to proceed with the "Cantor drawings" or other drawings, not involving greater labour or expense, so as to adjust the balance now against him in the Society's accounts. The Committee accordingly propose to issue the plates now in hand with early numbers of the Journal, as may be found convenient, as letter press must accompany them, and to proceed with others to the extent of the sum specified as advanced by the Society on this account.

(By order of the Committee,)

W. B. O'SHAUGHNESSY.

*Asiatic Society, 5th July, 1847.*

The report having been read it was unanimously agreed to authorize the Secretaries to take the best means in their power to secure work being done by Mr. Bennett in illustrations of the Journal to the extent of the advance he had received.

Mr. Piddington brought to the notice of the meeting that the tomb of Sir Wm. Jones is in a dilapidated state, and submitted an estimate by Messrs. Weaver and Co. for the repairs thereof, amounting to Rs. 386 10. Resolved that the estimate be referred to Col. Forbes for examination and report and that the expense of the repairs be defrayed by a subscription among the members of the Society.

*Books received for the Meeting of the 7th June, 1847.*

#### PRESENTED.

Proceedings of the Academy of Natural Sciences of Philadelphia, Nos. 4 and 5.—BY THE ACADEMY.

A cheap, simple, and concise method of obtaining early warning of any approach to Spontaneous Combustion or Ignition by Accident, on board of Steamers, Coal or other Ships, and of instantly conveying water nearly to the spot; with some chemical notes and practical deductions for the use of sailors, by H. Piddington, Esq.—BY THE AUTHOR.

Le Moniteur des Indes Orientales et Occidentales, No. 12.—BY THE EDITORS.

On the Relation of Islam to the Gospel, translated from the German of Dr. J. A. Mochler, by the Rev. J. P. Menge. (2 copies.)—BY J. MUIR, ESQ.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of June, 1847.—FROM THE SURVEYOR GENERAL'S OFFICE.

The Oriental Christian Spectator, Nos. 3 to 6.—BY THE EDITOR.

The Calcutta Christian Observer, for June and July, 1847.—BY THE EDITORS.

#### EXCHANGED.

Journal Asiatique, No. 40.

The Athenæum, 13 Nos. for 1847.

The Edinburgh New Philosophical Journal, No. 84.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 201.

#### PURCHASED.

The Annals and Magazine of Natural History, Nos. 125 and 126.

The Edinburgh Review, No. 172.

Journal des Savans, for January, February and March, 1847.

The Calcutta Review, No. 14.

The North British Review, No. 12.

Owing to the lateness of the hour the Curators' Reports were not received.\* The thanks of the Society were voted as usual to the donors of books and papers, and of contributions to the Museum.

#### Report of Curator, Zoological Department.

The following are the donations to which I have, upon this occasion, to call the attention of the Society.

1. From W. C. Thorburn, Esq. of Goalpara, I have received a collection birds, reptiles, fishes, and crustacea, which has added a few species to the Museum, as the *Emys dhonghoka*, Gray and Hardwicke, and some small fishes described by Buchanan Hamilton.

2. Mr. J. Weaver has favored us with a small collection of sundries, chiefly from the Sandheads; comprising a small fish allied to *Equula* (which I have not yet identified), two human fetuses, some sea Snakes, &c.

3. Mr. J. Reeve has sent a small Crocodile, 5½ feet long, of the species *Crocodilus palustris*, Lesson.

4. E. B. Ryan, Esq. A stuffed specimen of a Leopard.

5. J. C. Pépé, Esq. of Gurruckpore. A Boar skull, from the Nepal Terai, of the species or variety having a broad occiput, noticed in XV, 135.

6. Mr. E. Lindstedt. A Porcupine (*Hystrix*), of the common small species inhabiting the Sunderbuns.

7. Mr. Nathan Buckley. A specimen of a *Limulus*, or 'King Crab,' one of two species common at the mouth of the river. The present one is distinguished (among other characters) by having a cylindrical tail: and one sex only of the other corresponds to the definition of *Tachypleus*, Leach.

8. Mr. C. J. Madge. A living Bat, of the species *Megaderma lyra*. This Bat, which is the *M. carnatica* of Mr. Elliot, seems to be very generally diffused throughout India, being replaced in the Malay countries by *M.*

\* Mr. Blyth's MS. of his report received subsequently to the meeting is now inserted.

*spasma* (also in the Museum), and further east by the newly described *M. philippinensis*, Waterhouse, P. Z. S. 1843, p. 69; while in Africa it is represented by the *M. frons*.

9. Capt. Phayre, of Moulmein. A young living specimen of a Binturong—*Arctictis binturong*, (Raffles,) v. *Ictides ater*, Valenciennes. This little animal is very tame and playful, having most of the actions of a kitten, combined with a few Ursine traits; it also mews very like a young kitten when impatient of being left alone; and if gratified by being noticed, it purrs, like the *Felidæ* and many *Viverridæ* (as the *Paradoxuri*). The prehensile power of the tail is very great, and exists throughout that organ; by the extremity alone it will readily support its weight. By means of the limbs, also, it has great power of clinging, so as not to be easily dislodged when it has grasped a person by the leg, as it is rather fond of doing when suffered to run loose: indeed, though it bites only in play, its deciduary canines are so sharp that its fondness for grasping one's limbs is rather troublesome. Although its eyes, with the pupil contracted to the narrowest line during the day, indicate the naturally nocturnal habitude of the species, this animal is lively and always ready to play and frisk with any one, at all times of the day: the iris is of a light hazel colour. Mr. McClelland had a larger Binturong some time ago, from Assam, which was allowed its liberty, and passed its time chiefly upon a tree near his house; from which, instead of descending the trunk when it wanted to come down, it would sometimes drop from a height of several feet, as is the habit of the *Coatimondis* (*Nasua*) of S. America, which, with the Binturong, belong to the group of true *Plantigrada*. Indeed, I think the *Racoons* (*Procyon*) have the same habit, another genus pertaining to the same division.

10. From the Rev. J. Mason, of Mergui. Specimens of *Calotes versicolor*, and of *Hemidactylus Coctæi*, from the neighbourhood of Moulmein, and therefore valuable from the locality,—both reptiles being common in Calcutta. Also an imperfect skin of *Pomatorhinus olivaceus*, nobis, p. 451 ante; differing from the specimen previously described in having the crown of a more dusky olive than the back, though not slaty as in *P. schisticeps*.

11. From Capt. Thos. Hutton, of Mussoorie. A few bird-skins, among which is one species new to the Museum, viz. *Certhia himalayana*, Vigors, v. *asiatica*, Swainson; "common in the Deyra Doon." This is quite distinct from *C. nipalensis*, Hodgson, and from my *C. discolor*, inhabiting Sikim; making three Himalayan species of typical *Certhia*. The *C. spilonota*, Franklin, has been at length obtained by Mr. Hodgson from Behar, and is described as a new generic form, by the name *Salpornis*, by Mr. G. R. Gray, *Ann. Mag. N. H.* (May) 1847, p. 352; and with it Mr. Gray describes, as a new genus and species, a *Caulodromus Gracei*, which is my *Rimator malacoptilus*, p. 155 ante (February 1847), founded on the identical specimen, which was lent me for the purpose of being described by Mr. Grace, and so labelled by me when I returned it.

12. C. J. Bonnevill, Esq. of Rungpore. The limb-bones of a large Tiger.  
July 7th, 1847. E. BLYTH.

The following Supplementary Report refers to the Society's present collection of *Sciuridæ*, which was exhibited at the Meeting.

*Supplementary Report by the Curator, Zoological Department.*

The fine series of animals which I have now the pleasure to exhibit, illustrative of the great Squirrel family—*Sciuridæ*, comprises representatives of its three principal subordinate groups of Flying Squirrels, Ordinary Squirrels, and Marmots.



Of the first, we possess 23 (select) mounted specimens, pertaining to the divisions *Pteromys*, Cuv., as at present restricted, and *Sciuropterus*, F. Cuvier.

The species of restricted *Pteromys* are by no means satisfactorily determined; and I can only contribute a little towards their elucidation. The Society's specimens are as follow :—

1. *Pt. petaurista*, (Pallas): *Taguan* of Buffon, from Malabar; *Pt. oral*, Tickell, *Calc. Journ. N. H.* II, 401: *Pt. philippensis*, Gray, apud Elliot, *Madr. Journ.* No. XXV, 217. This is the only large Flying Squirrel of the peninsula of India, and probably of Ceylon;\* that of the Moluccas and Philippine Islands can hardly be the same. In all the specimens I have seen (excepting a pale variety to be noticed afterwards), the terminal two-thirds or three-fourths of the tail were black or blackish, with rarely a little white at the extreme tip. Upper-parts dusky maronne-black, grizzled with whitish tips to the fur, terminating in inconspicuous black points: membrane and limbs above, much brighter and more rufous maronne: feet, muzzle, and around the eyes, black: and the under-parts are dingy brownish-grey. An individual variety, procured in Travancore by Lord Arthur Hay, is much paler than usual, being of a light maronne-brown above with yellowish-white tips; the long hair behind the ears is pale rufous, instead of being dark; the fore and hind feet only are, in part, blackish, especially the former; the muzzle and around the eyes are dark brown; and the tail has its terminal three-fifths uniform rufous-brown, a little darker at the tip, while its base is paler with minutely mingled whitish hairs: under-parts with scanty annulated hairs, of a predominant pale colour; and two white streaks extend longitudinally along the rows of mammæ. Of this Indian species, I have retained for the Museum a very fine specimen, from Travancore, presented by Lord Arthur Hay; and an example of the young, brought alive to Midnapore probably from the Cuttack jungles, and presented (dead) by Mr. P. Homfrey.

2. *Pt. petaurista* (?), var. *cineraceus*, nobis. The common large species of Arracan and the Tenasserim provinces, and the only large kind I have seen from that range of territory. Very like the preceding, but the whitish tips to the fur more predominating, imparting a hoary-grey appearance to the whole upper surface, and continued along the tail, the extreme tip only of which is blackish; under-parts pure white, or nearly so, in different specimens; and the rest of the colouring much as in the preceding variety (?). In both, the white tips to the fur predominate in the newly put forth pelage, and disappear to a great extent as the fur becomes old and worn. In the young of the Arracan race, the black extreme points of the fur are much developed. We have two adults, and a small young specimen, from Arracan, presented by Capt. Phayre; and another adult, in worn pelage, and unusually rufescent with darker tail than ordinary, from Tenasserim, presented by the Rev. J. Barbe.

A third dark race, or species, of a bay-brown-colour above, variegated with white *splashes*, was procured at Malacca by Capt. Charleton, and has been described as *Pt. punctatus* by Mr. Gray, *Ann. Mag. N. H.* 1846, p. 211.† It is perhaps identical with *Pt. elegans* of Dr. S. Muller, from Java.

3. *Pteromys albiventer*, Gray, *Hardw. Ill. Ind. Zool.*: placed as a synonyme of the Malayan *Pt. nitidus* by Dr. Cantor, *J. A. S.* XV, 252; six speci-

\* A notice of the habits of the *Pteromys* of that island is given in Major Forbes's "Journal of a Residence of 11 years in Ceylon."

† *Felis Charltoni*, Gray, described on the same occasion, is merely an occasional variety of *F. bengalensis*. Major Jenkins favored the Society with a living specimen of this variety from Assam, and with two live specimens of the ordinary marking, all of which are now set up in the Museum. We have also an intermediate variety, which removes all doubt of the specific identity.



mens, however, assigned to Nepal, are enumerated in Mr. Gray's Catalogue of the mammalia in the British Museum. A very fine example, procured (or the skin purchased) at Simla by Capt. Thomas, 39th Regt. B. N. I, and by him presented to the Society. This is perhaps an excessively stretched skin of *Pt. magnificus*; but, in new pelage, the white tips to the fur are very little developed, and there is no pale colour upon the shoulders, nor on the sides and membrane above: under-parts throughout rufescent-white. Tail tipped with black as in *Pt. magnificus*, which is not represented in Hardwicke's figure of *Pt. albiventer*, though the tail of the latter is so short that it looks as if it had been mutilated of its black tip, as was doubtless the case with the original.\*

4. *Pt. magnificus*, (Hodgson,) *J. A. S. V*, 231. Specimen from Nepal, purchased of a Bhootea. Inhabits also the hill ranges of Assam, from whence Major Jenkins has favoured the Society with (imperfect) skins, entirely resembling those from the Himalaya proper.

5. *Pt. nobilis*, (Gray,) *Ann. Mag. N. H.* 1842, p. 263: *Sciuropterus chrysotrix*, Hodgson, *J. A. S. XIII*, 67. Very fine specimen, with the pale dorsal streak complete, presented by Willis Earle, Esq.; another, with dorsal streak between the shoulders only, and merely a slight trace over the croup, presented by Dr. Campbell; both from Darjeeling: a third, without a trace of dorsal streak, purchased of a Bhootea. Neither of these has any whitish tips to the fur, as in *Pt. magnificus*; but, in all other respects, the last especially approximates *Pt. magnificus* so very closely, that I cannot but doubt its distinctness as a species.

6. *Pt. nitidus*, Cuvier. Adult and young, from Malacca, presented by the Rev. F. J. Lindstedt. Hab. also Java, Sumatra, and Borneo, apud Schinz.

The remaining species, with shorter and distichous tail, appertain to the division *Sciuropterus*, F. Cuv.; and all of them are well defined as species.

7. *Sciuropterus caniceps*, Gray, *Ann. Mag. N. H.* X, 262: *Pteromys senex*, Hodgson, *J. A. S. XIII*, 68. Two specimens from Darjeeling: one presented by the lady of W. H. Oakes, Esq. C. S.; the other procured by exchange.

8. *Sc. fimbriatus*, Gray, *M. N. H. n. s.*, Vol. I, p. 84. Two specimens: one from Simla, presented by L. C. Stewart, Esq., now of H. M. 29th Regt.; the other in the Museum when I took charge of it. Inhabits the N. W. Himalaya. The colour of the upper-parts of this species resembles that of an English wild Rabbit.

N. B. A species seemingly allied to *Sc. fimbriatus*, but one-fourth larger, was figured by Sir A. Burnes as the *Mooshi baldar* of the mountain districts of Nijrow, and identified by him as the "Flying Fox" of the translation of Baber's memoirs (p. 145). A length of 2ft. is assigned to it; whereas I doubt (from examination of several specimens) if *Sc. fimbriatus* would ever exceed 19in, at the most. The colour of the upper-parts is represented as pale fulvescent ashy-brown, darker on the limbs; tail broad and bushy, and tipped with blackish: under-parts dull white, with a ferruginous margin to the membrane underneath. If verified, it might rank as *Sc. Baberi*, nobis.

9. *Sc. alboniger*, Hodgson, *J. A. S. V*, 231: *Sc. Turnbullii*, Gray, *P. Z. S.* 1837, p. 68; *M. N. H. n. s. I*, 68. Inhabits Nepal, Sikim, Bootan; common at Darjeeling. Three specimens, presented by C. S. Bonnevill, Esq., Mrs. Saxon, and J. Shave, Esq.

10. *Sc. villosus*, nobis, *n. s.*: referred to *Sc. sagitta* in Mr. Walker's Catalogue of Assamese mammalia, *Calc. Journ. N. H.* III, 266. Two speci-

\* The *Pt. melanotis*, Gray, *M. N. H.*, *n. s. I*, 584, and originally assigned to Nepal, is referred to Java in Mr. Gray's subsequent catalogue of the British Museum collection of mammalia, and there identified with *Pt. Diardii*, Tem., and with the *Pt. nitidus* apud Gray of Hardwicke's 'Illustrations.'

mens, presented by Mr. F. Bonyng, who procured them during his stay in Upper Assam; and as the same gentleman gave one to Mr. Walker at the time of that naturalist's visit to his station in 1842, there can be no doubt of the identity of the species with that referred to *sagitta* by Mr. Walker. This animal presents a still nearer approach than does the last to the Malayan *Sc. Horsfieldii*, Waterhouse, P. Z. S. 1837, p. 87 (vel *Pteromys aurantiacus*, Wagner); but the tuft of long fine hair surrounding the ears readily distinguishes it,\* also the smaller and clad ears, the brushes of hair impending the claws more especially of the hind-feet, and the last are much more densely covered with hair: the fur of the upper-parts is besides less fine, and more grizzled; and the blackish (or it might be termed black) base of the fur is more apparent on that of the lateral membrane; in *Sc. Horsfieldii* the fur is not blackish at base, but of a dusky-grey colour. Of the same size and form as *Sc. Horsfieldii* and *Sc. alboniger*, the present species is further distinguished from the latter by the bright ferruginous colour, with some pale tips intermingled, of its general upper surface; by its strongly rufescent tail, pale towards the base, and the deep ferruginous tinge of the fur of the under surface of its lateral membranes, which also more or less imbues the entire under surface of the body. Length (of a large specimen) 16 inches, of which the tail measures half; of the ear posteriorly  $\frac{3}{8}$  inch; and tarse to end of claws  $1\frac{1}{2}$  inch. Mr. Bonyng favored me with an interesting notice of the crepuscular habits of this little animal, in common with the rest of its tribe; and which recalled to mind Catesby's account of the little Flying Squirrel of the United States (*Sc. volucella*), by the remarks that—"in the dusk of the evening, when making their downward" (*i. e.* gradually descending) "leap, they look more like falling leaves than anything else." He adds—"They are very difficult to be got, though plentiful enough. Whenever the Singphos can catch and kill them, they do so."

(*Sc. fuscocapillus*, Jerdon. This is an undescribed species, from S. India, a notice of which may be introduced here. Length  $7\frac{1}{2}$  inch., of tail (vertebræ) 6 inch., the hair reaching  $\frac{3}{4}$  inch further: fore-foot proportionally large, measuring with claws  $1\frac{1}{8}$  inch: hind-feet wanting in the only specimen examined. Ears small, and almost wholly naked, of an ovate form, and measuring  $\frac{1}{2}$  inch long posteriorly. Tail very bushy, and but indistinctly distichous. Moustaches long and black. Fur rather long (the hairs measuring fully  $\frac{3}{4}$  inch on the back), porrect, of extremely fine texture, the individual piles sinuous, and those of the upper-parts fuscous to near the tips, which are of a rufescent-fulvous hue, or dark brownish-isabelline, forming the surface colour; on the croup the fur is shorter and more dense, somewhat as in *Sc. genibarbis*, (Horsf.); and upon the head it is much shorter, and the basal dusky hue predominates over the greyish-brown tips: above the volar membrane also the blackish hue is chiefly apparent. Under-parts rufous-white, extending to the cheeks and under-lip; the lateral fur margining the membrane rufo-fulvous. The hairs of the tail measure 1 inch and upwards, for its basal half or more, becoming gradually rather shorter towards the tip; their colour pale at base, then darker, producing an *ensemble* nearly of the colour of the back; but underneath, the tail is fuscous or blackish-brown, and the extreme tip is whitish.

11. *Sc. spadiceus*, nobis, n. s. pl. XXXVI, fig. 1. A diminutive species from Arracan, about 5 inch. in length, minus the tail, which measures  $4\frac{1}{2}$  inch.; tarse to end of claws  $1\frac{1}{8}$  inch. Upper surface bright ferruginous-bay in old specimens, with the membranes, limbs, and tail, dusky, and the basal fourth of the latter pale rufous underneath: under-parts dull white, with fur of a somewhat

\* In *Sc. genibarbis*, Horsfield, the tuft below the ear is more marked and circumscribed.

woolly texture : that of the upper-parts dusky except at tip. Three specimens, presented by Capt. Phayre.

Zoologists who profess the opinion that nearly allied races of animals, respectively inhabiting different localities, and presenting constant differences of colouring and other trivial distinctive characters, should be set down as permanent local varieties of the same rather than as distinct allied species,—leaving it quite optional, however, which should be considered a species and which a variety,—and who, with M. M. Temminck and Schlegel, thus regard the Indian *Sciurus purpureus* as a permanent local variety of *Sc. bicolor*, or rather both as races of the same *Sc. maximus*, might well incline to reduce the whole series of restricted *Pteromydes* to the rank of varieties only of a single widely distributed species, however true they may be and are to their distinctions of colouring, and although two such marked races as *Pt. nitidus* and *Pt. punctatus* inhabit together in the Malayan peninsula—both occurring in the vicinity of Malacca. But be this as it may, such various permanent races require discrimination : and the analogy of the *Sciuropteri* inhabiting the same countries, which are well distinguished apart by good specific characters, and are even more numerous than the *Pteromydes*, would point to the conclusion that the latter are alike distinct and independent of each other, at least in the generality of cases, however closely they may resemble ; and that theories on the geographical range of particular species, founded on the alleged specific identity of what can only be presumed to be varieties of the same, rest upon a very insecure and disputable foundation. I add a summary of the distribution of the Indian Flying Squirrels, with those of the eastern coast of the Bay of Bengal, as far southward as the Straits of Malacca.—Those of Ceylon remain to be identified. In the Indian peninsula generally, from the jungles of central India to Travancore, there have only been observed the *Pteromys petaurista*, and *Sciuropterus fuscocapillus* lately discovered (I believe in the Nilgherries). In the Himalaya, *Pteromys albiventer*, *Pt. magnificus*, and *Pt. nobilis*, would seem to appear successively, as we proceed from the N. W. to the S. E. ; and *Sc. Baberi* (?), *Sc. fimbriatus*, *Sc. alboniger*, and *Sc. caniceps*, present apparently a similar succession,—the two latter alone certainly occurring together, in Sikim. In the Assam ranges, *Pt. magnificus* re-appears, which would argue its existence in the intervening country ; and, indeed, it remains to ascertain whether *Pt. albiventer* and *Pt. nobilis* are really different from *Pt. magnificus*. *Sc. villosus* has been observed hitherto only in Assam. One or two species are found in Sylhet that I have not yet seen. In Arracan, there appear to be only the *Pt. petaurista* (?), var. *cineraceus*, which extends southward to the Tenasserim provinces, and the diminutive *Sc. spadiceus*. Lastly, the Malayan peninsula yields *Pt. nitidus* and *Pt. punctatus*, and *Sc. Horsfieldii* and *Sc. genibarbis*. From the great eastern archipelago the Society does not possess a single specimen.

Of the ordinary Squirrels (*Sciurus*), we may commence with a group of large species, or (more or less ?) permanent races, peculiar to S. E. Asia and its islands ; the whole of which are but local varieties of a single species, in the opinion of some zoologists.

1. *Sc. purpureus*, Zimmerman : *Sc. maximus* (in part), Schreber ; *Sc. bombayensis*, Baddaërt ; *Sc. indicus*, Erxleben ; *Sc. Elphinstonii*, Sykes. These synonymes, copied from Mr. Gray, and to which may be added *Sc. malabaricus*, Schinz, I believe to be correctly assigned to the common great Squirrel peculiar to the peninsula of India. So far as I have seen, it varies chiefly in the development of the black on the shoulders and fore-limbs, and that of the croup and thighs, which last is very commonly wanting, the former rarely more than reduced : the tail also has more or less black or



maronne-red above, with usually (if not always) a pale tip; the under-parts are more or less deep-coloured; and the relative proportion of the colours of the head is subject to variation, its dark portion being generally maronne when little developed, blackish when more extended: the line proceeding downward from the front of the ear is of very constant (if not invariable) occurrence; and may be presumed to exist in the black variety mentioned by Mr. Elliot (*Madras Journ.* X, 217), distinguishing it from the black race so common in the countries eastward of the Bay of Bengal. The great development of the fur upon the ear seems always to characterize this Indian race or species, and in a less degree the Himalayan and Assamese specimens of our No. 3; while in Arracan, Tenasserim, and Malayan specimens of the latter, and in the Cinghalese and Javan races, the ears are clad with very short hairs, as in the generality of Indian and Malayan *Sciuri*.\* I have retained three specimens for the Museum of *Sc. purpureus*, all set up while fresh by the Society's taxidermists.

2. *Sc. macrourus*, Forster (nec Say): also *White-legged Squirrel*, Pennant, 'Quadrupeds,' II, 407; and *Sc. ceylonensis*, Boddaërt. Pl. XXXVI, fig. 2. Mr. Gray refers this name to a Javanese race or species; and certainly Dr. Horsfield's figure assigned by him to *Sc. bicolor*, in the 'Zoological Researches in Java,' approximates the Ceylon animal considerably. In general, it has been placed as a synonyme of the preceding species; but the race has at least as good a claim to rank separately, as have either of the two next. The ears are clad with short hair, instead of being densely tufted: and the colouring is remarkably different. The Ceylon specimen figured (presented by Dr. R. Templeton, of Colombo,) measures about 2ft. long, of which the tail is half, its hair reaching 1½ in. further. Colour of the upper-parts dull maronne-black, much grizzled with whitish tips on the sides, croup, and haunches, and slightly on the back and shoulders; the croup having numerous buffy-white hairs intermixed: basal three-fifths of the tail black, with long white tips to the hairs, and a white median line underneath (or behind); the rest or terminal portion brown with less conspicuously developed white tips, except at the end, where these gradually disappear: cheeks, under-parts, and limbs, almost pure white, with a slight fulvescent tinge; but there is an abruptly defined blackish patch on the upper portion of the fore-limbs externally, passing upward to the shoulder, a corresponding grizzled patch on the hind-limbs continuous with the colouring of the croup and haunches, and the toes of all the feet are blackish: there is also a blackish patch on the crown of the head, and a few blackish hairs on the white cheeks; a dull whitish occipital band behind the ears; and the short fur upon the outside of the ears is whitish, excepting a slight black pencil anteriorly.—The only other specimen I have seen was procured in Travancore, and sent to me on loan by Walter Elliot, Esq.; and I took of it a minute description, which I here subjoin.†

\* Upon the whole, the variation I have observed in different individuals of this race, from distantly separated localities, is, after all, but trifling, and does not appear to be influenced by locality.

† Length about 21 inches, of which the tail measured 9 inches, or with its hair 10 inches. Fur of the upper-parts coarse and rigid at tip, a little waved, or not lying even and smooth; the basal two-thirds fine and soft, of an umbre-brown colour, as is also the first portion of the thicker extremity; the tips being of a pale straw-colour, imparting a grizzled appearance: crown of the head, and base of the anterior limbs, darker; rest of the head, with the occiput, throat, breast, and the four limbs, pale isabella-brown, or dirty straw-colour, the hair along each side of the belly conspicuously longer (as likewise in the Ceylon specimen); that of the under-parts, and beneath the fore-limbs, short and much frizzled, and tinged with ferruginous: the toes of all the feet are blackish-brown above: tail coloured like the back at base, the brown colour predominating



3. *Sc. bicolor*, Sparrman, apud Horsfield, *Proc. Zool. Soc.* 1839, p. 151 ; also apud Schinz, and Cantor, *J. A. S.* XV, 246 : *Sc. affinis*, Raffles (the pale variety, which is also *Sc. aureiventris*, Is. Geoffroy) ; *Sc. giganteus*, McClelland, described in *P. Z. S. loc. cit.* ; *Sc. macrouroides*, Hodgson, enumerated (not described) as new in *J. A. S.* X, 915 (1841). That Sparrman's brief Latin diagnosis applies very well to the present race or species is undeniable ; but as it was founded on a Javanese specimen, and there would appear to be some doubt whether the race under consideration inhabits Java, Mr. Gray refers the name *bicolor* to another and well known Javanese race, placing it as a synonyme of *Sc. javensis*, Schreber ; while for the animal here treated of, he adopts the name *macrouroides*, Hodgson, which yields precedence to *giganteus* of McClelland, as applied to the same dark variety of the race. Regarding, however, (with Dr. Cantor,) the pale variety common in the Malayan peninsula as, without doubt, specifically the same as the ordinary dark variety, the rejection of the name *bicolor* for this race would render it necessary to adopt the name *affinis*, Raffles, for the normally coloured or dark variety as well as for the pale variety, and notwithstanding that Raffles alludes to the former by the name *Sc. maximus*, under which Schreber comprehends what are here provisionally regarded as different species of these great Squirrels. But it remains to ascertain, upon sufficient authority, whether it be true that the present race does not inhabit Java. Schinz, who describes it correctly, gives Java, Sumatra, Borneo, and Ceylon, as habitats—the last named locality doubtless following from his mal-identification of *Sc. macrourus* of Ceylon with the race under review. In the Malayan peninsula it abounds (and there alone it would seem that the pale variety occurs) ; also, proceeding northward, in Tenasserim, Arracan, Sylhet, Munneepore, and Assam, as well as in the S. E. Himalaya, as especially about Darjeeling. In specimens from all this range of territory, the dark variety exhibits no variation worth mentioning, (certainly no local variation,) except that the ears of Himalayan and Assamese specimens are pretty densely tufted (though less so than in *Sc. purpureus*), while this is not the case with those from Arracan, Tenasserim, and the Malayan peninsula. In adults, the upper-parts seem to be always deep black in the new pelage, becoming bleached and oftentimes very rusty as the fur gets old, especially upon the back towards the croup ; and this faded fur may be commonly seen to be succeeded by deep black fur in specimens that were changing their coat. The young would seem to be always thus rusty above, and when small are very pale about the croup. The under-parts are more or less deep-coloured in different individuals. A black band on the cheek, descending backward from before the eye, is of very regular occurrence ; and above this, the yellowish-white colour is more or less continued forward ; the sides of the upper lip are sometimes black, sometimes white, or with black and white hairs intermixed. The following specimens have been retained for the Museum. One from Darjeeling, presented by the late Mr. Webb of that place ; one from Arracan (with some pale hairs intermixed along the tail), presented alive by Capt. J. R. Abbott ; one from Amherst (remarkably fine), presented by E. O'Ryley, Esq. ; another, from Mergui, presented by the Rev. J. Barbe ; and one from Malacca, by the Rev. F. J. Lindstedt. Also two specimens of the pale variety, from Malacca, presented by Mr. Frith and Mr. E. Lindstedt.

4. *Sc. javensis*, Schreber, var.—Mr. Gray, in his catalogue of the mammalia in the British Museum, still admits three Javanese races of these large Squirrels, as distinct : adopting the name *hypoleucos*, Horsfield, for one of about the middle, and whitish at the end.—This description does not exactly tally with the Ceylon specimen ; but the species is the same, beyond all question, and the general similarity of the two specimens is considerable.

them, and *macrourus*, Forster, for another : but the latter, as we have seen, must be reserved for the Cinghalese race ; and the former was subsequently considered by Dr. Horsfield as " a mere variety of *Sc. Leschenaultii*," (i. e. *javanensis*). A single specimen in the Society's collection, presented by the Batavian Society, is of a uniform fuscous-brown above and along the upper surface of the tail ; the sides rather paler and obscurely grizzled with a lighter hue ; the anterior part of the head whitish, passing off gradually in whitish tips on the crown : shoulders more distinctly grizzled ; and the entire under-parts and limbs externally sullied white, inclusive of the anterior portion of the outside of the thigh ; ears pale and rusty, as are also the cheeks and sides of the neck : and the tail underneath is whitish throughout its length, bordered externally (i. e. the hairs tipped) with the hue of the upper-parts : whiskers long and black. The structure is absolutely as in the preceding race.

5. *Sc. Rafflesii*, Vigors : *Sc. Prevostii*, Desm., apud Schinz : *Sc. rufogularis* et *rufoniger*, Gray, apud Cantor (who expresses his suspicion that *Sc. redemitus*, Van der Boon, will prove to be another variety of the same). Two Malacca specimens ; one presented by R. W. G. Frith, Esq., the other procured by exchange : and a remarkable variety, according to Dr. Cantor, (nearly allied to that termed *rufoniger* by Mr. Gray,) with no white anterior to the shoulder, which is replaced by black mingled with rufous on the face, and by rufous on the neck and humerus : there is also a broad lateral band of greyish-white tips to the fur above the ordinary white lateral band ; the fur of the haunches is tipped with albescent-brown ; and the tail is clad with broadly white-tipped hairs, except at its extreme tip and base above. Dr. C. has a variety, from the Malayan peninsula, in some degree intermediate to this and to the ordinarily coloured Malayan individuals. The specimen here described is doubtless from the Archipelago, having been presented by the Batavian Society : Schinz states it to inhabit Borneo and Malacca.

The following four races (and seemingly others) have the same claim to be considered local varieties of a single species, as have the various great Squirrels exemplified by Nos. 1, 2, 3, and 4 : but each would seem to be always true to its particular colouring (in its own proper habitat) ; and it is difficult to conceive that local causes should exercise so much influence in modifying the coloration, or that variable species should continue so very true to their colouring over a great extent of country as is the case with the several races under consideration.

6. *Sc. hippurus*, Is. Geoff. : *Sc. rufogaster*, and probably *Sc. castaneoven- tris*, Gray, *Ann. Mag. N. H.* 1842, p. 263. From the Malayan peninsula. Body above, from occiput to base of tail, fulvous-brown picked with black, continued a little way on the tail ; rest of the tail black : head, sides of neck, and limbs externally, grizzled dark ashy, *contrasting strongly* with the fulvous hue of the back : under-parts, and inside of limbs, deep rufo-ferruginous, and generally an admixture of the same upon the ears. Two specimens : one presented by R. W. G. Frith, Esq. ; the other procured by exchange.

7. *Sc. rufiventer* (?), Geoffroy :\* *Sc. erythrogaster*, nobis, *J. A. S.* XI, 970 ; *Sc. hypopyrrhus* (?), Wagler, Schinz (No. 34). From northern Assam and Munneepore. Throughout dusky-ash above, picked with fulvous, nearly as upon the head and limbs of the preceding race : below deep rufo-ferruginous, as in the latter : hairs of the tail annulated black and fulvous, with long black tips occupying more and more of each hair to the end, where they become wholly black, and the terminal two-thirds of the tail appear to

\* This was supposed to be N. American : but the species inhabiting N. America are now tolerably well known, especially since Dr. Bachman's researches ; and none corresponding with the description of *Sc. rufiventer* has been there discovered. \*

be thus almost wholly black externally. Specimen from Munneepore, presented by Capt. C. S. Guthrie.\*

8. *Sc. erythræus*, Pallas. From Lower Assam and Cherra Poonjee. Resembles the last, but is more fulvescent, and the sides of the neck and outside of the limbs tend to be a little more ashy than the rest, but not contrasting strongly (as in the Malayan race): terminal three-fourths of the tail of the same deep rufous as the under-parts, with a pale and sometimes whitish extreme tip. Ears also red. Two specimens from Cherra Poonjee, presented by F. Skipwith, Esq.; and two small young, from Assam, presented in spirit by Major Jenkins, and since stuffed; these latter have much black towards the base of the tail, especially underneath.

9. *Sc. Keraudrenii*, Lesson, *Cent. Zool.* pl. I.; *Sc. ferrugineus*, Cuv. (*M. S. ?*), apud Schinz. From Arracan and Pegu. Entirely of a deep rufous-ferruginous colour, rather darker above than below, the fur of the upper-parts somewhat glistening: toes of all the feet blackish, as in the three preceding; and the extreme tip of the tail yellowish-white. Two specimens from Arracan, presented by Capt. Phayre.†

10. *Sc. vittatus*, Raffles: *Sc. bivittatus*, Desmarest.‡ This retains the rufous belly of the preceding species, but the colour is weaker; there is also a rufous tip to the tail: the size is smaller, and a new feature of colouring presents itself in the two contiguous lateral stripes, the upper white and the lower black, which separate the grizzled colouring of the back from the rufous of the belly. It abounds in the Malayan peninsula, Sumatra, &c.; and numerous specimens have been presented to the Society, of which three are retained for the Museum.

11. *Sc. nigrovittatus*, Horsfield: *Sc. griseoventer*, Is. Geoffroy. This differs chiefly from the last in having the under-parts albescent greyish instead of rufous, and there is no rufous at the tip of the tail, but a little at its base underneath; terminal half of the tail obscurely ringed: the upper lateral stripe is tinged with fulvous; and there is a rufous tinge on the cheeks. Specimen from Malacca, presented by C. Hufnagle, Esq. Hab. also Java.

12. *Sc. atrodorsalis* (?), Gray, *Ann. Mag. N. H.* 1842, p. 263: Pl. XXXVII, fig. 2. Size of *Sc. vittatus*, with an exceedingly fine bushy tail. Upper-parts golden-fulvous grizzled with black; the former predominating, especially upon the head: a broad longitudinal deep black patch on the back and croup, commencing behind the shoulders, and becoming evanescent posteriorly: breast and under-parts light rufescent, deepening towards the tail, the hairs of which are black with long pale ferruginous (or rufous-isabelline) tips:

\* Very close to this must be *Sc. pygerythrus*, Is. Geoff. (in the Zoology of Belanger's Voyage), "from the forests of Syriam in Pegu." Colour brown picked with fulvous above, below bright rufous, extending up the base of the median line of tail, which latter is coloured like the back and indistinctly annulated.—Specimen *a*, assigned to *Sc. erythræus* in Mr. Gray's catalogue of the mammalia in the British Museum, seems referrible to this.

† Specimen *b*, from Bhotan, assigned by Mr. Gray to *Sc. erythræus* (*Brit. Mus. Catal.*), is described to have the "tail-end black, top of the head bright rufous; throat grey, grizzled; belly duller red." His specimen *c* has the "tail-end, bright red:" India only being given as the locality. The bright rufous top of the head shows a gradation towards *Sc. Keraudrenii*.

‡ Prof. Schinz refers this to the subsequently described *Sc. flavimanus*, Is. Geoff. (in the Zoology of M. Belanger's Voyage): the latter is stated by M. Is. Geoffroy to be very closely allied to *Sc. vittatus*, but to be distinguished by having the upper surface of the feet, front and outside of the fore-arm, and above the muzzle, fulvous: tail not tipped with rufous, but annulated to its extremity; and there is no white line along the flanks. Hab. Ceylon or Cochin China,—in all probability the latter, rather than the former, locality.



whiskers long and white. Specimen presented by the Rev. J. Barbe, from the Tenasserim province of Ye.\*

13. *Sc. chrysonotus*, nobis, n. s. (Pl. XXXVII, fig. 1): a dull-coloured specimen described in *J. A. S.* X, 920. Size of *Sc. Rafflesii*, or measuring about 20in. long, of which the tail is half, its hair reaching 2in. or 2½in. further. General colour grizzled fulvous above, the limbs and tail grizzled ashy (from each hair being annulated with black and pale fulvescent), with an abruptly defined black tip to the latter: under-parts and inside of limbs pale grizzled ashy: in bright specimens, the nape, shoulders, and upper-part of the back, are vivid light ferruginous or golden-fulvous, sometimes continued to the tail, more generally shading off gradually towards the rump, and in some but slightly developed even upon the nape and shoulders: whiskers long and black; and slight albescent pencils to the ears, more or less developed. Common in the Tenasserim provinces. Five picked specimens, presented by the Rev. J. Barbe, and E. O'Ryley, Esq., of Amherst.

14. *Sc. lokroides* (?), Hodgson, *J. A. S.* V, 232: *Sc. assamensis*, McClelland, apud Gray, who regards this as different from *Sc. lokroides* of Nepal; but Mr. Hodgson's description of the latter fully applies.† From examination of a very considerable number of specimens, collected at Darjeeling, different parts of Assam, Cherra Poonjee, Tipperah, and Arracan, I can perceive no diversity whatever, in those from different localities, unless it may be, perhaps, on the average, that the Himalayan specimens are somewhat more rufescent underneath; but every gradation is even here observable. Mr. Gray, however, extends the range of *Sc. assamensis* to Darjeeling; and I have seen no specimens from Nepal proper. It is nearly allied to the preceding species, but is smaller, with rarely a trace of the black tip to the tail, and the nape and shoulders are uniformly coloured with the rest of the upper-parts: the whole being more or less rufescent in different specimens, in a slight degree only; and sometimes when most so, the under-parts are most albescent, or scarcely sullied. In some the tail is very rufescent underneath, on the median line nearly throughout its length. I retain for the Museum two Darjeeling specimens, presented by Mrs. Saxon and C. S. Bonnevill, Esq.; two from Assam, presented by Major Jenkins and W. C. Thorburn, Esq.; one (half grown), from Cherra Poonjee, presented by F. Skipwith, Esq.; and three from Arracan, presented by Capt. Phayre and Capt. Abbott.

14. a. In the collection of a native gentleman (who has obligingly favored me with the loan of the animal, for comparison with the various allied species), is a living specimen of a Squirrel, (pl. XXXVII, fig. 3,) habitat unknown, which differs from *Sc. lokroides* (? v. *assamensis*) in having the under-parts and inside of limbs deep ferruginous as in the next, except the throat and breast, passing along the median line of the belly, which parts are of a deep grizzled ash-colour without a tinge of rufous, and much of the same hue as the crown and exterior of the limbs and feet: the body and tail having a fulvescent tinge, but less strong than is usual in *Sc. lokroides*; and the tail being slightly black-tipped, but with pale ends to the hairs. The rufous of the under-parts does not extend underneath the tail. It this be considered distinct and new, it may bear the name *Sc. griseopectus*, nobis.

15. *Sc. lokriah* (?), Hodgson, *J. A. S.* V, 232: *Sc. subflaviventris*, Mc-

\* *Sc. atrodorsalis*, Gray, is assigned to Bhotan.—“Gray; middle of the back blackish, slightly grizzled; cheeks and whiskers yellowish; ears, chest, belly, and under side of limbs, dull rufous: tail blackish—hair with a broad black central band.” Not improbably a dull specimen of that above described, with the locality erroneous.

† Mr. Gray refers *Sc. griseoventer*, Is. Geoff. (*Zoology of Belanger's Voyage*), from Java, to *Sc. assamensis*, instead of to *Sc. nigrovittatus*, Horsfield, with which it agrees entirely.



Clelland, apud Gray, who considers it distinct from *Sc. lokriah* of Nepal; though again the original description of the latter fully applies. Nearly allied to the last, but more rufescent, and deeper ferruginous below; the tail more or less deeply ferruginous underneath or behind, where bordered on each side with black subterminal and pale extreme tips. Two specimens from Darjeeling, presented by Mrs. Oakes and the late Mr. Webb; one from Cherra Poonjee, presented by the late Dr. Griffith; and a small specimen from Arracan, and a bad skin of another, presented by Capt. Phayre,—both of these having the under-parts considerably paler than is usual in Darjeeling specimens, though occasionally the latter are equally pale. In Arracan this species inhabits a higher elevation than No. 14.

16. *Sc. tenuis*, Horsfield: *Sc. annulatus*, Desmoulins; *Sc. modestus*, S. Muller.\* Nearly allied to the last, but smaller, and the under-parts dingy rufescent-whitish. Inhabits Java and Borneo. Specimen presented by the Batavian Society.

We now come to the group of small striped Squirrels, of which three sub-groups may be distinguished. The first of these has a median *white* line along the back.

17. *Sc. palmarum*, Lin.: *c. penicillatus*, Leach, *Zool. Misc.*, I, tab. 1. Mr. Gray refers the following species to this latter; but I am satisfied that he is incorrect in doing so: no mention is made by Dr. Leach of the rufous underneath the tail, which is so prominent a characteristic of *Sc. tristriatus*; the sides are said to be “pale yellowish,” which applies to *palmarum* and not to *tristriatus*; and Dr. Leach’s specimen was taken from a nest formed in a library at Madras, which (so far as I have seen of the habits of the two species) decides at once in favour of *palmarum*: I doubt much whether *Sc. tristriatus* ever enters buildings; whereas I have observed *Sc. palmarum* to abound in the town of Madras. The discrimination of the two species is undoubtedly due to the late accomplished Curator of the Zoological Society’s Museum (now employed at the British Museum), and I have pleasure, therefore, in restoring to him the nomination of *Sc. tristriatus*, the more especially as Leach’s figure of his (so called) *penicillatus* is execrable, and the character upon which it is separated from *Sc. palmarum* most unsatisfactory. Of these two nearly allied species, *Sc. palmarum* only is found on the alluvium of Lower Bengal, where, as also in the plains of Upper India, it is the only representative of this vast genus. The specimens I have had set up were obtained on the Society’s premises.

18. *Sc. tristriatus*, Waterhouse, *Mag. N. H.* 1837, p. 496; *Proc. Zool. Soc.* 1839, p. 118. Two specimens set up, of many procured by myself in the Midnapore jungles; and a third, from Ceylon, presented by Dr. R. Templeton, of Colombo. It is remarkable that the voice of this little animal is most particularly unlike that of the preceding species; though, in both of them, the notes are pretty sure to be mistaken for the chirruping of birds, by persons unacquainted with the sound;† the voice of *Sc. tristriatus* first attracted my attention in the jungle, and I watched for it some time in the supposition that it was a bird I had not met with before. *Sc. palmarum* was found about equally common in the same situations: but I think the tendency of this is to approach human habitations, and of *Sc. tristriatus* to avoid them. The size and proportions of recent examples of these two species (examined together) are absolutely the same; but the diversity of voice, and

\* *Sc. philippinensis*, Ogilby, *P. Z. S.* 1839, p. 117, would also seem to come very near.

† This chirruping voice would help to ally these small striped Squirrels to the equally striped *Tamias* subgroup, as exemplified by the *Chipping Squirrel* of N. America, *T. lysteri*.

that of habit as shown by one only of them extending its range to the Gange-tic delta, superadded to the slight though constant differences of colouring (alike in *Sc. tristriatus* from the jungles N. W. of Midnapore to Ceylon), indicate the extreme caution necessary ere we conclude other allied races to be merely varieties of the same, from their general similarity of size and colouring.—N. B. The Palm Squirrel of Pennant's 'Quadrupeds' (II, 415), from Ceylon, with "an *obscure* pale yellow stripe on the middle of the back," &c., may perhaps prove to be a third allied species of this subgroup, and there may be others yet undiscriminated.

Other species have a *black* medial dorsal line, as the two next which are closely allied, and have conspicuous small white-tipped pencil-tufts to the ears.

19. *Sc. McClellandii*, Horsfield, *P. Z. S.* 1839, p. 152: *Sc. Pembertonii*, nobis, *J. A. S.* XI, 887. Inhabits Sikim, Bootan, and the hill ranges of Upper Assam. Two specimens from Darjeeling; presented by the late Mr. Webb and Mrs. Oakes. This diminutive species has a deep black median dorsal streak, and two much less conspicuous brown lateral streaks, divided from the former by dull pale streaks of the same breadth with the last, and beyond the lateral dark streak is one of an albescent-buff colour: tail margined behind nearly as in *Sc. lokriah*, or rufous subterminated with black, and tipped with brownish-buff.

20. *Sc. Barbei*, nobis, *n. s.* (Pl. XXXVI, fig. 3). Resembles the last in size and structure, but is much more vividly coloured. There are five distinct black bands, three of equal length and breadth, the outermost less developed; alternating with four rusty-whitish bands, of which the two outer are rather brighter than the two inner, and are continued forward to the moustaches, passing beneath the eye: under-parts and inside of limbs bright pale ferruginous: the tail margined behind as in the preceding species, or rufous, each hair subterminated with black, but tipped with *white*. Three specimens, from the Tenasserim province of Ye, presented by the Rev. J. Barbe.

The next would seem to form an analogous little subgroup with *Sc. insignis*, Horsf., of Sumatra and Java.

21. *Sc. sublineatus*, Waterhouse, *P. Z. S.* 1838, p. 19: *Sc. Delesserti*, Guérin, *Mag. Zool.* 1842, and *Zoologie du Voyage de M. Ad. Delessert*, where figured. Inhabits the Nilgherries. Specimen presented by T. C. Jerdon, Esq. This minute Squirrel has remarkably dense close fur (as described of *Sc. insignis*), of a dark grizzled olive-colour, tinged with tawney, and having three pale lines alternating with four dark ones on the back and croup; the outer dark lines narrower and somewhat less dark than the others. It has thus the median line pale, as in *Sc. palmarum* and *Sc. tristriatus*; whereas *Sc. insignis* is described to have the median line dark (but this, I suspect, needs confirmation): under-parts dull tawney: the tail grizzled dusky and ferruginous.

22. *Sc. vulgaris*, Lin. Specimens in summer and winter pelage, presented by Mr. Bartlett and by the Cornish Institution. Inhabits Europe and Northern Asia.

23. *Sc. hudsonius*, Pallas. N. America. Presented by Mr. Bartlett.

Finally, of the Marmots, we possess—

*Arctomys bobac*, Schreber: *Mus arctomys*, Pallas: *Arct. himalayanus* and *A. tibetanus*, Hodgson, *J. A. S.* X, 777, and XII, 409. Adult and young (not in good condition), the former presented by Capt. Huddleston, who brought it from Almorah; the latter procured near Darjeeling by the late Mr. Webb: and a living young one, now more than half grown, presented by G. A. Bushby, Esq., as noticed in p. 385 ante. This little animal continues in perfect health and vigour, and has only now (in the middle of July)

just put forth its shorter summer pelage. It does not appear to be in the least degree distressed by the temperature of Lower Bengal, but is, in general, merely kept away from direct sunshine during the heat of the day: and (as always with this genus) it is perfectly fearless and tame, but without distinguishing individuals. It makes a loud chattering cachinnation not unfrequently. At first, when turned loose, this Marmot used generally to collect as much grass as he could carry, and take it to the place where he was kept; but I have not observed him to do this of late, though he probably again will by and bye.

I will now consider the range of distribution of our Indian true *Sciuri*, and those inhabiting the eastern side of the Bay of Bengal, as far southward as the Straits of Malacca.

As with the Flying Squirrels, the group of true *Sciuri* is not much developed in India proper. Thus, in the peninsula and Ceylon, only five species are known, all pertaining to subgroups peculiar to this part of the world,—viz. that of the gigantic Squirrels (the races or species of which are brought together by some Zoologists as varieties only of *Sc. maximus*, Schreber), and that of the diminutive so called Palm Squirrels.\* Of the latter, *Sc. palmarum* would seem to be diffused generally over the plains, where it is the only species met with; as in the Gangetic delta, beyond which it does not pass eastward (that I have been able to learn), nor into Assam, while to the north it ranges to the foot of the hill country, and in a N. W. direction till checked by the great deserts.† Southward, it is said to inhabit Ceylon, and to abound on the table-land of the Deccan; while in more undulating ground it is found together with the next species. *Sc. tristriatus* takes the place of *Sc. palmarum* in more hilly districts, to a moderate elevation; abounding along the ranges of ghâts on either coast of the peninsula, also in Ceylon, and extending northward to the borders of the Gangetic delta, and thence westward into central India: it probably also occurs on the Rajmahl and Monghyr hills in Bengal, if not also in the sub-Himalayan sâl forest; but further observations are required to trace satisfactorily its geographic range, as it has been very generally confounded with *Sc. palmarum*. The little *Sc. trilineatus* is exclusively a hill species, confined to a more elevated range of country; having been hitherto observed only in the Nilgherries: but a representative of it (if not the identical species) might be looked for in Ceylon, if not also in the Mahabuleishwar. Of the two great Squirrels, *Sc. purpureus* seems to be generally diffused, or nearly so, throughout the hill jungles of the peninsula; except perhaps in the extreme south and in Ceylon, where *Sc. macrourus* inhabits and probably replaces it. The *Sc. dschinschicus*, Gm. (v. *ginginianus*, Shaw), founded on *l'Écureil de Gingi* of Sonnerat, and probably the same with *Sc. alborittatus*, Desmarest,—a species apparently allied to *Sc. plantani* of Sumatra and Java,—is greatly in need of confirmation as an inhabitant of India.

Passing now to the Himalaya, I have no information respecting the species (if any) inhabiting the N. W., or Alpine Punjab, or even to the westward of Nepal; but to the S. E. (as in eastern Nepal, Sikim, Bootan), there is the large black Squirrel, *Sc. bicolor* apud nos, which spreads thence to the hill ranges of Assam, and those of Munneepore, Sylhet, Arracan, Tenasserim,

\* I cannot say that I have absolutely never seen *Sc. palmarum* upon a palm; but it assuredly does not resort much to the *Palmacea*. These diminutive striped Squirrels come very much on the ground, as their affinities with the Ground Squirrels (*Tamias*) would intimate; and are about equally terrestrial and arboreal: they are continually seen, with feathery tail upraised, running about and crossing one's path on the ground; but immediately retreat to a tree upon alarm.

† Vide *J. A. S.* XV, 168.



&c., at least as far as the Straits of Malacca: also, in Nepal, the allied *Sc. lokriah* and *Sc. lokroides*, of the size of *Sc. vulgaris*; which a little further east (as in Sikim) would be represented, according to Mr. Gray, respectively by *Sc. subflaviventris* and *Sc. assamensis* of McClelland—though the latter certainly accord with the descriptions of *Sc. lokriah* and *Sc. lokroides*, and I cannot but very strongly suspect them to be the same. Both these Sikim species continue their range to the Assamese mountains, and with them a diminutive striped Squirrel—*Sc. McClellandii*, which probably inhabits a greater elevation.\*

In Bootan, besides the last four, there should be, according to Mr. Gray, *Sc. erythræus* (var., with “top of the head bright rufous”), *Sc. caniceps*,† and *Sc. atrodorsalis*; but it is not improbable that the localities of the two latter are given erroneously,—the last seeming to be my Tenasserim species (No. 12), referred to the same with a mark of doubt.

Upon the hill ranges of Assam, the same species occur as in Bootan—at least the four that range thence from Sikim: while *Sc. rufiventer* (? with black tail) abounds to the northward, and in the hills surrounding the valley of Munneepore; the very doubtfully distinct *Sc. erythræus* (with rufous tail) representing it southward, and about Cherra Poonjee (north of Sylhet).

In Sylhet, Tipperah, and Arracan, *Sc. lokroides* (? v. *assamensis*) continues very abundant; and probably also *Sc. lokriah* (? v. *subflaviventris*) at a greater elevation, as certainly in Arracan: and in the last named province the entirely red *Sc. Keraudrenii* abundantly replaces *Sc. erythræus* of Lower Assam and Cherra Poonjee, and has the same claim with *Sc. rufiventer* (?) to be considered a mere variety of *Sc. erythræus*. In Pegu, there is again the *Sc. pygerythrus*, Is. Geoff., additional to *Keraudrenii* (though probably not in the same localities), which also would seem to exhibit but another variation of the same specific (?) type. *Sc. bicolor*, *Sc. Keraudrenii*, *Sc. lokriah* (?), and *Sc. lokroides* (?), are the only true Squirrels which I know to inhabit Arracan.

Proceeding further south, in the Tenasserim provinces we only recognise the large *Sc. bicolor*, among the preceding species: and there is a diminutive striped Squirrel, *Sc. Barbei*, which is nearly allied to *Sc. McClellandii* of Sikim, Bootan, and N. Assam. The only others I know are *Sc. chrysonotus*, which seems to be very common, and may be said to represent *Sc. lokroides* (?) of Arracan, &c.,—and *Sc. atrodorsalis* (?), of which I have seen only a single specimen: but I doubt not that others inhabit the provinces; and we might specially look for a representative of the *erythræus* type—perhaps *Sc. pygerythrus*, Is. Geoffroy.

In the Malayan peninsula, there appears again to be a complete change in the *Sciuride*, excepting only the great *Sc. bicolor*, which continues identically the same; though exhibiting here a remarkable pale variety, in addition to the ordinary dark race. The *erythræus* group, however, finds its representative in *Sc. hippurus*: and another group with conspicuous stripes on the flanks, very characteristic of the Malay countries, is exemplified by *Sc. vittatus* and *Sc. nigrovittatus*. The beautiful *Sc. Rafflesii* is common southward: and there is also the very curious *Tupaia*-like *Sc. laticaudatus* (vide XV, 251). Dr. Cantor adds *Sc. tenuis*, Horsfield, which I have seen only from Java; and it is very probable that *Sc. insignis* of Sumatra and Java inhabits the mountains: *Sc. plantani* should be likewise sought for. The habitat “India,” attached by Mr. Gray to this last named species, as

\* *Sc. lokriah*, *Sc. lokroides*, and *Sc. McClellandii*, are erroneously assigned by Prof. Schinz to Bengal.

† “Pale grey, grizzled: back yellowish; beneath, paler grey: tail long, grey, black-varied, ringed; hair with three broad black bands.” *Ann. Mag. N. H.*, 1842, p. 263.



also to *Sc. Rafflesii* and *Sc. rufoniger* (*Rafflesii*, var.?), may be safely regarded as *certainly erroneous*.

The Society's present collection of *Sciuridæ* comprises 88 specimens, of 35 (provisionally assumed) species, for the most part—with very few exceptions—select and in excellent condition. Of these, 23 belong to the subgroup of Flying Squirrels, 3 (inclusive of the living Marmot) to that of Marmots, and the remainder to the very extensive genus *Sciurus*. In the "Catalogue of the Mammalia in the Museum of the Asiatic Society," published in *J. A. S. X*, 660 *et seq.* (August, 1841), not a single specimen is enumerated; but there were 6 in the Museum when I took charge of it, in the following month, of which one only (*Sciuropterus fimbriatus*) now remains, the rest (*Sciuropterus alboniger*, *Sciurus purpureus*, *Sc. vittatus*, *Sc. lokriah*?, and *Sc. McClellandii*.) having since been replaced by better specimens.

Our present desiderata, among the Flying Squirrels, are those of Ceylon, *Sciuropterus fuscocapillus* of S. India, *Sc. Horsfieldii*, *Sc. genibarbis*, and *Pteromys punctatus*, of the Malayan peninsula, with the species generally of the Archipelago, and series of the large *Pteromydes* of the Himalaya—particularly of its N. W. ranges—that might aid in determining the specific types. Of the true *Sciuri*, a series of *Sc. macrourus* of Travancore and Ceylon, illustrative of the variation to which this race is subject; and the small striped species generally of S. India and Ceylon, including even the common *Sc. palmarum*. Should such a species as *Sc. dschinschicus* or *alborittatus* occur, (dull-greyish or fulvescent, with a white or yellowish-white stripe on each side, and the size a little exceeding that of an English Squirrel,) specimens would be particularly acceptable; and fine specimens are desirable of all the small or middle-sized species inhabiting Arracan and the Tenasserim provinces; and the species generally of the Archipelago, with the curious *Sc. laticaudatus* of the Malayan peninsula. Indeed, of those we already have, more specimens of *Sc. nigrovittatus* of the last named locality, and of *Sc. trilineatus* of the Nilgherries. Also *Sc. lokriah* and *Sc. lokroides* from Nepal proper: any Himalayan species found to the westward of Nepal; and the species before referred to, as stated by Mr. Gray to inhabit Bootan. Of the Himalayan and Tibetan Marmots, good specimens are extremely acceptable: and of all the Flying Squirrels, without exception, good specimens are generally acceptable for transmission to the Hon'ble Company's Museum in London, and to various other scientific Institutions.

#### *Addendum to first Report.*

In p. 864 ante, I took occasion to point out that my *Rimator malacoptilus*, p. 155 ante (February), had been redescribed by Mr. G. R. Gray from the same specimen as *Caulodromus Gracei*, in the *An. Mag. N. H.* for May of the present year: it now again appears, as a new genus and species, by the name *Merva Jerdonii*, Hodgson, in the 'Calcutta Journal of Natural History' for April, but published in the middle of August: the paper, however, bearing date of December 1846. But the latter is of no recognised importance; and my description of this bird had indeed been awaiting an opportunity for publication since 1845, when Mr. Grace was in Calcutta. I certainly did my utmost to prevent any *doubles emplois* with Mr. Grace's specimens; having sat up till late at night in labelling his whole collection, as that gentleman will remember: and as he well knew that I had pointed out the *Rimator* as new, and with his permission, named and took a description of it for publication, Mr. Gray's synonyme might at least have been spared. Whether my published description of this curious little bird is sufficiently perspicuous and intelligible, must be left for others to judge: but it is greatly to be regretted that these synonymes should thus unnecessarily accumulate.

A question of priority of publication fairly arises, when a Journal falls into arrear, so that its No. for a particular month is not actually published for several months afterwards. Thus, in No. 29 of the *Cal. Journ. N. H.*, dated April, but published in August, there are papers bearing the author's date of May! Which, therefore, in *doubles emplois* cases is to be considered the date of publication of a particular name? Surely not April, for an article written in May! The obviously correct mode is to have the actual date of publication printed on each No. of a periodical, as is now done on the cover of the Society's Journal: though as the latter is generally thrown away when the volumes are bound up, a more permanent place of record is desirable.

In *Archibuteo cryptogenys*, Hodgson, published in the same No. of the *Cal. Journ. N. H.*, I think I recognise my *A. hemiptilopus*, *J. A. S.* XV, p. 1. *Butaquila strophiiata*, H., is, I very strongly suspect, the *Hieraëtus pennatus* (v. *Spizaëtus milvoides* of Jerdon), which is not rare in Lower Bengal during the cold season. With reference to the remarks on the other Indian Buz-zards, it may further be mentioned that besides *Buteo rufinus* (v. *canescens*, v. *longipes*),—which is common in Lower Bengal above the tideway of the rivers,—Mr. Jerdon has described a *B. rufiventer* in the supplement to his catalogue of the birds of peninsular India, *Madr. Journ.* XIII, 165; and that my *B. pygmæus* (nec *nanus*), *J. A. S.* XIV, 177, has hitherto been observed only on the eastern side of the Bay of Bengal.

*Felis Ogilbii*, Hodgson, (*ibid.* p. 44,) would appear to be the same small Cat which Mr. Gray has named *F. Charltoni* (from a Darjeeling specimen), as noticed in note to p. 865 ante, and which I consider to be a mere variety of *F. bengalensis* (v. *nipalensis*, &c. &c.)—*F. macrocelis* (v. *macroceloides*), perfectly identical with the Sikim animal, inhabits the mountains of Arracan, as shown by a skin in the Society's Museum: and as several Malayan animals extend their range to Arracan, and as there is considerable diversity in the ground colouring and general appearance of two Sikim specimens of this Cat in the Society's collection, I doubt exceedingly whether any sufficient diversity has been observed between the Sikim, Tibet, and Arracan specimens of it, on the one hand, and the Sumatran specimens on the other, to warrant their being assumed to be distinct, however remarkable and unusual this geographic range.

Lastly, respecting the alleged five species of four-horned Antelope, also noticed in the same No. of the *C. J. N. H.*, it appears to me that they may be safely again reduced to two, viz. *Tetraceros quadricornis*, v. *chickera*, and *T. subquadricornis*, Elliot. *T. iodes*, H., as described, applies exactly to the Bengal animal, in every particular; and among the fine series of specimens in the Society's Museum, there is one of a young male (that I had alive) with the fore and hind horns of the same relative size as in Hardwicke's figure (*Lin. Tr.* XIV, tab. 15), but the position of the horns in that figure is erroneous, as shown by reference to the attached description, and I was informed that the skeleton in the Museum of the Royal College of Surgeons, London, was that of the identical individual figured by Gen. Hardwicke, the horns in this being placed as usual in the Bengal animal. When at Midnapore, last cold season, I saw together, in the possession of O. W. Malet, Esq., a pair of the common *T. quadricornis*, and a pair of what I considered to be Mr. Elliot's *T. subquadricornis*; both (as I understood) from the jungles at no great distance from that station, where I myself obtained a fawn of the former species: and this adds to the probability of both species being likewise found in the sub-Himalayan sâl forest: indeed, they both also occur in Southern India, for Mr. Elliot some time ago sent me for recognition a skin of *T. quadricornis* procured in the Wynaad.

As for the affinities of these little Antelopes, they are nearly allied to the *Tragelaphi*, Ham. Smith, of Africa (or the *Boschbok*, *Gaib* or Harnessed Antelope, and their congeners); and the former bear exactly the same relation to the Nilghai of India, which the latter do to the Koodoos (*Strepsiceros*) of Africa. The ringed markings of the feet occur throughout the whole series, more or less distinctly: and the posterior horns of *Tetraceros* resemble those of *Portax*, or the Nilghai; and, as in the latter, frequently recline backward in captive-reared individuals, instead of taking the normal curve upward. The females of all are hornless: and I even doubt if there be any good generic character to distinguish the females of *Tetraceros* from those of *Tragelaphus*; though the latter are somewhat heavier and more Hog Deer like in form, especially the *Boschbok* of the Cape. Both groups are monogamous; and they closely resemble in habits, manners, and gait.

Aug. 10, 1847.

E. BLYTH.

NOTE.—In p. 779 ante, I referred the *Fringilla petronia*, Lin., to Mr. Hodgson's genus *Gymnoris*: but I find that the latter is synonymous with *Petronia*, (Ray) Bonap.; and the species is designated *P. rupestris* by the Prince of Canino. Gmelin, however, had previously designated it *Fringilla stulta*, as shown by Mr. H. E. Strickland; and the latter name will accordingly stand as the specific appellation. The group differs from the closely allied genus *Passer* in having a non-bulging, perfectly conical, bill, more or less thick; also in coloration, which in both sexes approaches that of the females of *Passer*, with constantly a yellow spot in front of the neck, weaker in the females: and, I much suspect, in their exclusively arboreal habits; whereas all the true Sparrows resort (more or less) to buildings.—The species known to me are 1, *P. stulta*, (Gm.)—2, *P. superciliaris*, A. Hay, nobis, XIV, 553—and 3, *P. flavicollis*, (Franklin.) The second is nearly allied to the first, but with the more slender bill of the third.

With respect to *Passer hispaniolensis* and *Sturnus unicolor*, two species common to Afghanistan and N. Africa (p. 779 ante), it is remarkable that both likewise inhabit Sardinia. This island has long been known as a locality for the latter species; and Bonelli states that the former is the only Sparrow found in Sardinia. According to Capt. Widdrington, neither *P. hispaniolensis* nor *P. cisalpinus* inhabits Spain. The former was, I believe, named from a caged specimen obtained at Gibraltar.

To the synonymes of *Pteromys albiventer*, p. 865 ante, add *Pt. inornatus*, Is. Geoff., figured in Jacquemont's Atlas.—E. B.

#### *Report of the Curator Museum of Economic Geology for the months of June and July, 1847.*

*Economic Geology.*—We have to report for these months several useful additions to our Museum which are—

12 large specimens of Marble from Mr. Weaver, and 10 smaller ones from Messrs. Currie and Co.

Also a specimen of marble from the new Christian Church at Alexandria.

Dr. Dodd of the H. C. Mint has favoured us with 20 specimens, some of which are rare, others will fill up blanks in our Mineralogical Series, and some, though duplicates, are much finer specimens than we possess. We shall I trust be able on our side to add to Dr. Dodd's collections in exchange for some of these.

Our active contributor Captain Sherwill, of the Dinapore Survey, sent down to me some specimens for identification, which I examined and replied to him.



*Geology and Mineralogy.*—I have looked over and chemically examined some of the specimens presented by Captain Kittoe in April. Many are common, but a few are worth notice.

1. A very good specimen of Asparagus-green Tourmaline, with small crystals of red Tourmaline amongst it; the green a new mineral for India, as far as I recollect. We have pale apple-green, white and blue tourmalines, from America, and the Alps, in our collection; but none of this colour, which is rarer than many other sorts. The red ones, though minute, are perfect Rubellites.

Our specimen is evidently from a vein and weathered, so that probably larger crystals may be found there.

Before the blowpipe it becomes by long heating opaque and slaggy on the edges, though still preserving its green colour, so that it has the appearance of a small lump of copper slag or Uranium ore under the magnifier.

The hardness is 6.7, and the specific gravity 3.3.

2. A remarkable apple-green quartz rock with bands of rose-coloured felspar and transparent quartz running through it. This is, both mineralogically and geologically curious; for, as will be seen afterwards, it is the rare case of pure silicate of iron so often met with in sand, and disseminated in other rocks and minerals, forming nearly a rock by itself.

Another specimen of the same kind is mixed with grey and white quartz and minute crystals of Iron pyrites. This specimen was carefully examined, as the pyrites might be auriferous, but nothing but Iron with slight traces of arsenic was detected. The pure green rock also, when pulverized, yielded nothing but iron and silica, both via *humida* and by the blowpipe, to which it gave with borax the usual green glass.

3. A specimen, sent, I presume, as the Plumbago mentioned with a note of interrogation at p. 492, is not Plumbago, but a rolled specimen of magnetic Iron ore, mixed with silvery mica and quartz; forming together a remarkable light grey diallage-looking rock with a strong pearly lustre in certain lights. It is highly magnetic but infusible before the blowpipe, which only renders it slightly slaggy at the edges. It dissolves largely in Hydrochloric acid but gives only Iron to re-agents. We have a specimen which approaches to this from the iron mines of Ajmeer, but it is certainly not common, and if a definite compound, should form at least a separate variety, for the purer sorts might be termed Diallage iron-ore.

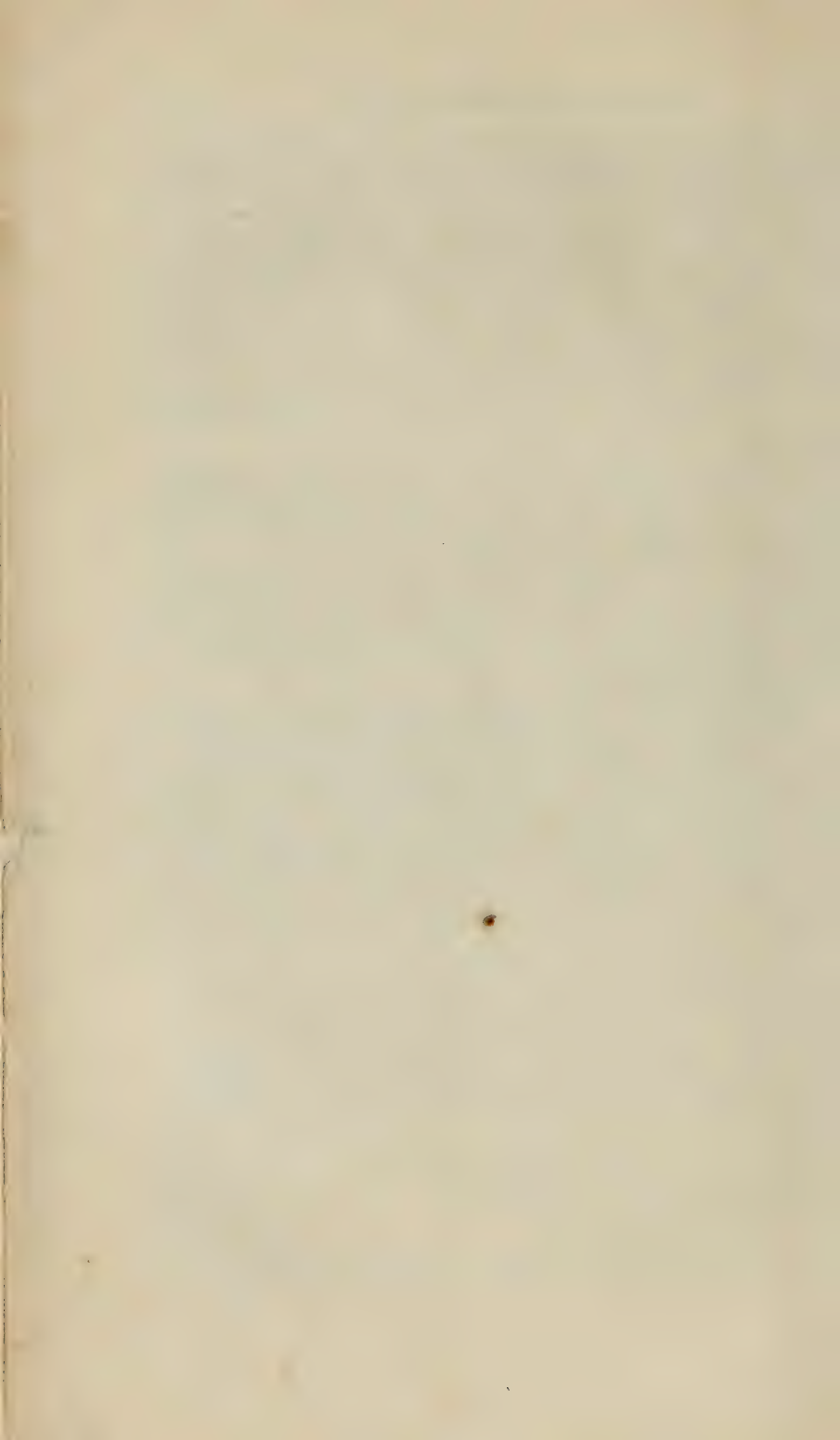
4. A fine specimen of flesh-coloured felspar, of which we had but a very small piece in our collection.

5.—A good specimen of granular and fibrous Tremolite.

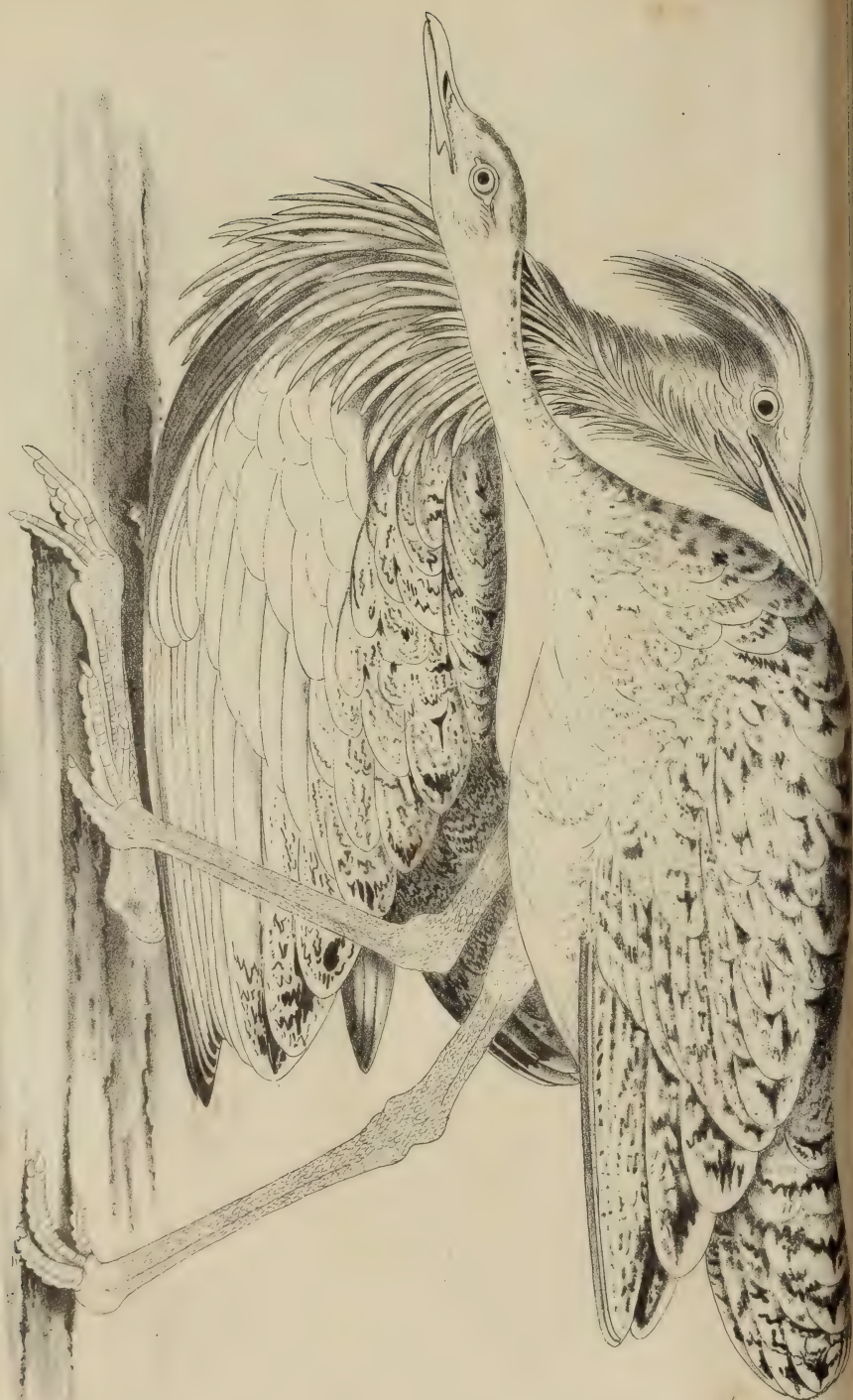
We have no localities I regret to say, for these minerals. I will write to Captain Kittoe to learn if he can recollect the place where he collected them.

Captain Sherwill, of the Dinapore Survey, as already mentioned, has sent a few specimens for examination: amongst them are a remarkable variety of massive Asbestos, much resembling lithomarge in appearance, but of which the fibrous structure when crushed and its behaviour before the blowpipe place it in the asbestos family: specimens of the same altered by heat have also been sent.









THE GREATER FLORICAN OF THE TARAI.

JOURNAL  
OF THE  
ASIATIC SOCIETY.

SEPTEMBER, 1847.

*On the Charj, or Otis Bengalensis.* By B. H. HODGSON, Esq.

Family STRUTHIONIDÆ VEL OTIDÆ.

Sub-family OTINÆ.

Genus Eupodotis.

Species *bengalensis* vel *deliciosa* vel *himalayana*.

Charj and Dábar of Hindusthan and Bengal.

Greater Florican of British Sportsmen.

Habitat. The Tarai.

Of all Indian game birds the most striking to the eye and the most grateful to the palate is the Charj or Dábar. Latham introduced it to the scientific world above half a century back; and yet so little had been added in the interim to his crude knowledge of its real character and habits that Mr. Vigors could recently suppose it an inhabitant, or at least visitant of the sub-Himálayas;\* nor am I aware that any one has to this hour undertaken to give intelligible body and shape to the mere scientific shadow of a species delineated by Latham. As the Charj is found more abundantly in the Tarai than elsewhere, and as I happen to possess a tolerably accurate knowledge of its structure and habits, (the latter very difficultly procurable,) I purpose to present to the Society in the following paper the substance of my information respecting this most elegant and high-flavoured bird, which our own sportsmen with the gun, and native chiefs and Princes with the Baz,†

\* Gould's Century, where is a very bad figure.

† *Astur palumbarious* fam. Goshawk.—Male is Júrú.



pursue with an energy proportionate to the value of a prize not to be exceeded for the table, especially in March, when it is in highest condition.

*Habitat and Range.*—The Charj appears to be confined to the Bengal Presidency, and to a part only of it, for I find no notice of this species in the Catalogues of Jerdon, of Sykes, or of Franklin, and in fact even in the Gangetic provinces the Charj is nearly limited to the left bank of the Ganges, and there to the districts adjacent to the sub-Himálayas, though I believe it is also found in the somewhat similar districts intervening between south Behar and Nagpúr and Midnapur. “Tarai” is an Indian term equivalent to Pays Bas, Landes, Marches, and Marshes, of European tongues; and *the* Tarai par excellence is applied to a low lying, moist and rarely redeemed tract of level waste extending, outside the Saul forest, along the base of the sub-Himálayas from the debouche of the Ganges to the Brahmaputra. This tract, of great extent and peculiar features, is the favourite and almost exclusive habitat of the Charj, which avoids the mountains entirely, and almost, if not quite, as entirely, the arid and cultivated plains of the Doab, and of the provinces west of the Jumna, the latter of which are still less suited than the Doab to the Charj’s habits, which prompt it to dwell upon plains indeed and exclusively, but never upon nude or cultivated plains. Shelter of nature’s furnishing is indispensable to it, and it solely inhabits wide spreading plains sufficiently elevated to be free from inundation and sufficiently moist to yield a pretty copious crop of grasses, but grasses not so thick nor so high as to impede the movements or vision of a well-sized bird that is ever afoot and always sharply on the look out. Such extensive, well-clad, yet uncultivated plains are however to be found only on the left bank of the Ganges, and accordingly I believe that to that bank the Charj is nearly confined, and to the Tarai portion thereof.

*Manners.*—The Charj is neither polygamous nor monogamous, nor migratory nor solitary. These birds dwell permanently and always breed in the districts they frequent, and they dwell also socially, but with a rigorous separation of the sexes, such as I fancy no other species could furnish a parallel to. Four to eight are always found in the same vicinity though seldom very close together, and the males are invariably and entirely apart from the females, after they have grown up.

Even in the season of love the intercourse of the sexes among adults is quite transitory, and is conducted without any of that jealousy and pugnacity which so eminently distinguish most birds at that period. In the season of love the troops of males and females come into the same neighbourhood, but without mixing. A male that is amorously disposed steps forth and by a variety of very singular proceedings, quite analogous to human singing and dancing, he recommends himself to the neighbouring bevy of females. He rises perpendicularly in the air, humming in a deep peculiar tone, and flapping his wings. He lets himself sink after he has risen some 15 or 20 yards; and again he rises and again falls in the same manner, and with the same strange utterance, and thus perhaps 5 or 6 times, when one of the females steps forward, and with her he commences a courtship in the manner of a Turkey-cock, by trailing his wings and raising and spreading his tail, humming all the time as before. When thus, with what I must call song and dance, the rites of Hymen have been duly performed, the male retires to his company, and the female to her's; nor is there any appearance (I have, at some cost,\* had the birds watched most closely) of further or more enduring intimacy between the sexes than that just recorded, nor any evidence that the male ever lends his aid to the female in the tasks of incubation and of rearing the young. The procreative instinct having been satisfied, the female retires into deep grass cover and there, at the root of a thick tuft of grass, with very little semblance of a nest, she deposits two eggs, never more nor less, unless the first be destroyed. If the eggs be handled in her absence, she is sure to discover it and to destroy them herself. The eggs are of the size and shape of an ordinary domestic fowl's, but one sensibly larger and more richly coloured than the other. This larger and more highly tinted egg is that of the male young, the smaller and less richly hued egg, that of the female progeny. The female sits on her eggs about a month, and the young can follow her very soon after they chip the egg. In a month they are able to fly; and they remain with the mother for nearly a year, or till the procreative impulse again is felt by her, when she drives off the long since fully grown young. Two females commonly breed near each other, whether for company or mutual aid and help; and thus the coveys, so to speak, though they are not literally

\* Unhappily I lost a valuable man by malaria.

such, are usually found to consist of 4 to 6 birds. The Charj breeds but once a year in June, July. That is, the eggs are then laid, and the young hatched in July, August. The moults are two annually, one vernal from March till May, and the other autumnal, which is less complete and more speedily got over between August and October. The young males up to the beginning of March entirely resemble the females; but the moult then commencing gradually assimilates them to the adults, which never lose, as the lesser species or Likh\* is alleged to do after the courting season, the striking black and white garb that in both species is proper to the male sex, and permanently so to the larger species from and after its 1st year of age. The young males of a year have the hackles and crest less developed than those graceful ornaments afterwards become, though otherwise after their moult there is little difference to be seen in them from the aspect of maturity. There is therefore properly speaking no nuptial dress in this species, though the hackles and crest in their most entire fulness of dimensions may be in part regarded as such. The Charj is a shy and wary bird, entirely avoiding fully peopled and fully cultivated districts, but not averse from the neighbourhood of a few scattered squatters whose patches of cultivation, particularly of the mustard plants (Rai, Tori, and Sarsún) are acceptable to the Charj as multiplying his chances of appropriate food. This exquisitely flavoured bird is a rather promiscuous feeder, small lizards, young snakes, insects of most sorts, but above all, locusts, and after them, grasshoppers and beetles, the sprouts and seeds and succulent runners of various grasses, berries, stony fruits, aromatic lactiferous leaves, and stems of various small plants, with mustard tops and other dainties, all contributing to its nourishment. The largest portion of its usual food is vegetables: but, when insects abound and especially locusts, they are almost exclusively eaten. Cerealia are eschewed: but plenty of hard seeded grasses and such like are taken, and a goodly portion of gravel to digest them. The Charj is seldom found in thick cover. When he is, he lies close, so that you may flush him at your foot; but in his ordinary haunts

\* *Otis Auritus*: fæm. fulvus: long confounded with the Charj and cited erroneously by that name even by Mr. Jerdon. Not half the size of the Charj, common in the western, rare in the eastern, Tarai, and visits the valley of Nepal in May, June, when the moult is just on.



amid the scattered tufts of more open grassplats he can be neared with difficulty only, and No. 5 and a good heavy gun are required to bring him down at 40 to 60 yards' distance. His flight is strong, with a frequent, rapid, even, motion of the wings, and, if he be at all alarmed, it is seldom suspended under 2 to 300 yards, whilst not unfrequently it is continued so as to carry the bird wholly out of sight and pursuit. When flying the neck is extended before the body and the legs tucked up under it, whereas the whole family of the Herons fly with neck retracted over the back, and legs stretched out behind; differences the rationale of which can as little be conjectured as the gyrations of the Dog ere he lays himself down to repose. The walk of the Charj, like that of the Heron, is firm and stately, easy and graceful: he can move a foot with much speed, and is habitually a great pedestrian, seldom using his powerful wings except to escape from danger, or to go to and from his feeding ground, at morn and eve, or to change it when he has exhausted a beat. This species is silent and tranquil, and seldom utters a sound, but if startled, its note is a shrill metallic clink, chik-chik, and the more ordinary note is the same but softer and somewhat plaintive. The amorous ditty of the male has already been mentioned. The female is silent on those occasions.

*Aspect, form, and size.*—The Charj or Dábar is a largish and very graceful bird, measuring 2 to  $2\frac{1}{4}$  feet from tip of bill to tip of tail, and  $3\frac{1}{2}$  to 4 feet in expanse of wings, and weighing 3 to 4 lbs. Bill to gape  $2\frac{1}{4}$  inch, to brow  $1\frac{1}{2}$ . Wing 14 inches. Tail 7. Tarse 6 to  $6\frac{1}{2}$ . Central toe and nail  $2\frac{1}{8}$ . The bill is short and rasorial, or rather crane-like, (Anthopoides.) The eye, large and soft. The head depressed, and adorned, in the males, with a full pendant crest. The neck, long and thin, but in the males set off with a beautiful series of hackles or slender composed plumes depending from the whole front of the neck. The body is plump. The wings ample and firm. The tail, short, broad and rounded; and the legs, long and suited to much walking. I will now give some more minute details which the incurious can pass over.

Bill to gape, equal to head, considerably depressed towards the base, and at the base twice as broad as high. Maxilla more than half excided by a large membranous and plumed fosse in which the elliptic nares are situated. Towards the tip the maxilla is rounded, full and



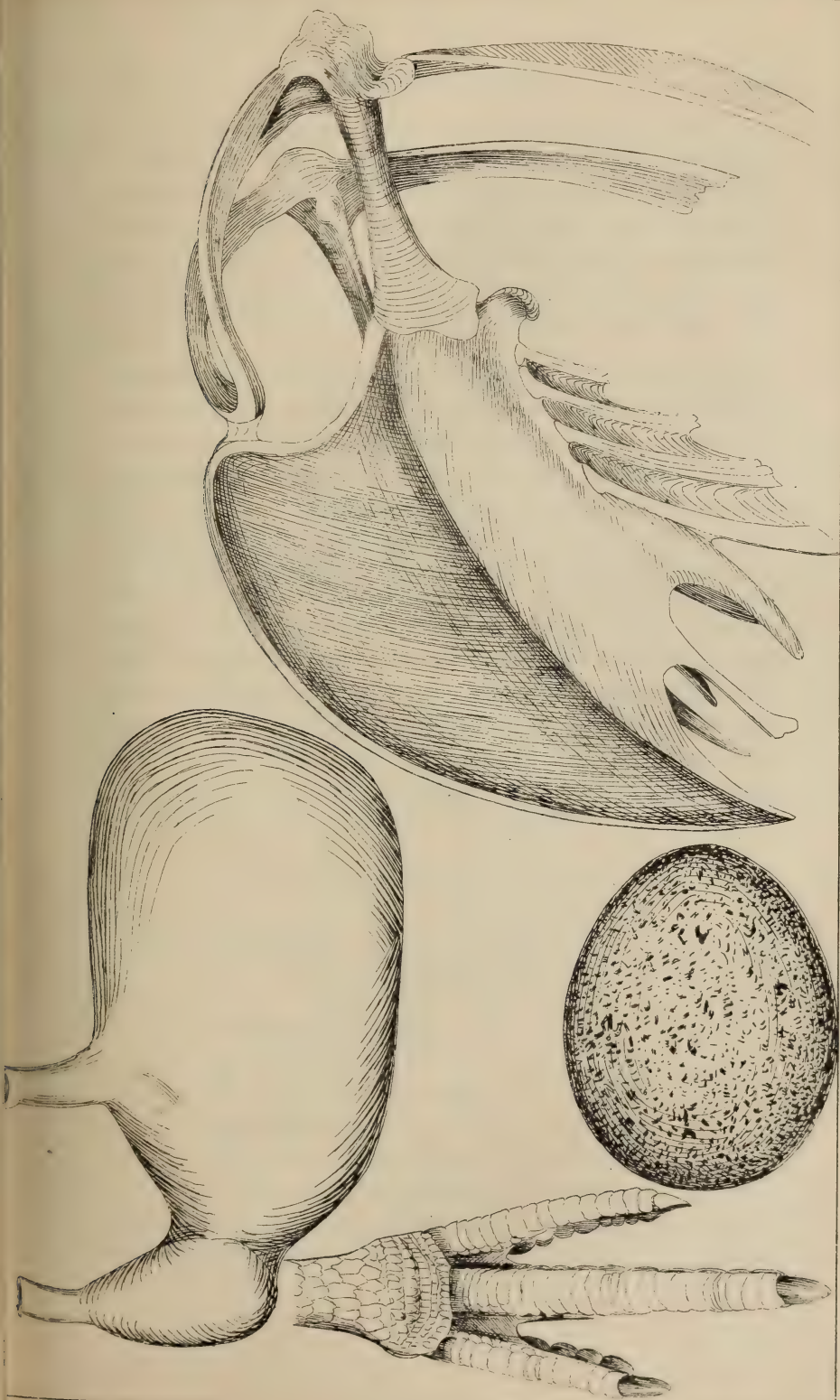
hard, with its tip inclined and notched. Mandibula straight and entire. Gape ample, soft, smooth. Frontal plumes produced far over the bill. Crest full, dishevelled, pendant, 4 inches long. Hackles narrow, composed, 3 inches long, extending from the gullet to the breast. Wings ample, nearly equal to the tail, about one inch less; its end, firm, not bowed, 3rd or 4th quill longest; 1st and 2nd but slightly gradated. Primes somewhat acuminate in the males, but less so than in the Likh, and emarginated sharply high up on both webs. Tertiaries broad, soft, not discomposed, but exceeding the primes in length. Tail 16 plumes, moderately and evenly rounded, with upper coverts nearly equalling the plumes. Legs elevate, strong, reticulate throughout. Tibia half nude and about equal to the tarse. Toes short, stout, scutellate, full soled, united by a small basal membrane. Central toe much the largest. Laterals slightly unequal. Nails obtuse, strong, solid, pent or convex above, flat below.

*Colours.*—Male. Head, neck, and body below, glossy black. Back, scapulars, tertiaries next them, and tail-coverts richly marbled, cuneated and zigzagged with jet black upon a rich buff ground. Alars white. Their tips, shafts and external margins (in 3 quills) black; caudals black with white tips and more or less of buff mottling. Legs sordid stramineous with a bluish tinge. Bill dusky plumbeous above. Blue grey below. Carneous towards the gape. Eye pale hazel.

*Female.* Of a rich buff or pale pure fulvous where the male is black. Her alars black, vermiculated more or less with buff. Her neck yet more minutely zigzagged crosswise with brown and her entire upper vest and tail, superbly cuneated, barred and zigzagged with a glorious game mixture of black and fulvous. On the cap the same hues, disposed lengthwise. Sexes of equal size.

*Eggs.*—The eggs, about the size of those of a bantam, two inches long by  $1\frac{1}{2}$  broad, are of a sordid stramineous hue, very minutely dotted and more largely blotched and clouded with black, somewhat as in *Lobivanellus goensis*, or the Indian Lapwing.

*Osteology.—Sternum.*—The entire form and substance of the breast bones indicate great powers of flight. The sternum is 4 inches long,  $2\frac{1}{4}$  high and  $1\frac{1}{2}$  wide. Culmenally it describes a high convex curve with the edge of its keel, which is itself (the keel) no less than  $1\frac{1}{2}$  inch deep. Postcally the sternum terminates gradually and has its walls or





sides disappearing in rear with a slope exhibiting two rather deep notches on either side. The furcula is strong, moderately bowed outwards, but very round at its junction with the keel, and curved highly in the culmenal direction so as to fall in with the high convex sweep of the sternal keel. The furcula is not ankylosed with the head of the sternum as in the largest migratory Storks and Cranes. The clavicles are very strong and have very powerful and large crura. (See sketch).

*Soft anatomy.*—The intestinal canal is little more than one length of the bird from tip of bill to tip of tail; about  $1\frac{1}{2}$  of the skeleton; 28 to 30 inches in length, and of large diameter. Cæcum 7 to 8 inches long, dilating globosely towards the blind end, and situated 5 to 6 inches from anal extremity of intestines. Stomach  $8\frac{1}{2}$  inches by 2, along greater and lesser arches, a sub-gizzard. Outer coat of considerable, unequal thickness, but much below the true gizzard type in muscular mass, and the muscle pale and flaccid. Inner coat leathery and striated. Shape of stomach more or less ovoid; its upper orifice central; its lower, terminal. Towards the latter a curved constriction dividing a small glandulous, from the general triturant portion of the organ. No trace of gular sac. Tongue medial, simple; its tip sub-bifid.—This bird is congeneric with the Likh (*Auritus*) which Mr. Gray separates from *Otis* and places in Lesson's Genus *Sypheotides*, hodie *Eupodotis*. I had named the form, *Oticulus*.



*The Slaty blue Megaderme. Megaderma schistacea, N. S.*—By B. H. HODGSON, Esq.

#### VESPERTILIONIDÆ.

##### RHINOLOPHINÆ.

(*PHYLLOSTOMINÆ* of Gray.)

Genus *Megaderma*?

*Megaderma schistacea*, mihi.

Habitat, Northern Bengal towards the Tarai.

It is very seldom that the observer of Nature has an opportunity at once and adequately to describe a species in its habits and mature form,



and when the opportunity occurs it should never be neglected, since a great deal of most unprofitable labour in the gradual rectification of those inadequate descriptions which are the inevitable consequence of the ordinarily limited means of observation, is thus prevented. Chance lately threw such an opportunity in my way in regard to a species of the Bat kind; and, though the 80 genera and innumerable species of the Vespertilionidæ, might well alarm an unprovided field Naturalist like myself, I trust I shall be able to see my way through a fitting description without the spectacles of Library and Museum.

Arriving recently at the staging Bungalow of Siligori, on the verge of the Sikim Tarai, I found that hospitium scarcely habitable owing to the stench of Bats, and was told that orders had already been issued for the ejection of these unwelcome tenants by the removal of the false roof, between which and the external pent roof the creatures had domiciled themselves, so securely and in such numbers that summary measures of ejectment had become indispensable. I waited to see and profit by these measures, and so soon as the false or flat canvas roof was partially removed, I beheld innumerable (2 to 300) Bats clinging in the usual inverted manner to the pent roof. Presently they were most of them on the wing. Many escaped by passing between the wall and eaves, their usual way of egress prior to this disturbance. And these fled, freely through the mid-day sun, to the proximate out houses. Many more were struck down by my people whilst attempting to pass out by the doors; and thus, in half an hour, I became possessed of some 50 to 60 specimens, when the slaughter was suspended by my orders: my specimens and observations then and for 10 previous days having left me nothing further to learn, and the wanton destruction of the poor creatures being shocking to me, how amusing soever to the group of natives, who moreover declared that the Superintendent had commanded the whole to be destroyed. My ample spoils were procured towards the close of February under the circumstances just stated, and the examination of them, coupled with the observations of the preceding ten days of my residence at the Bungalow, put me in possession of the following numerous and decisive particulars as to the habits of the animal, to wit, that this species of *Megaderme* is extremely gregarious, and dwells in the dark parts of houses and out-houses, not concealed in crannies or holes, but openly suspended from any convenient rest;





MEGADERMA *schistacea* (Hodgson)

that the species does not hibernate (nor I fancy does any Indian Bat, even in the lofty and cold sub-Himalayas, under at least 5000 feet of elevation); that it is entirely nocturnal, though capable of a vigorous flight even at noon of a sunny day; that it is exclusively insectivorous, and has no such cannibal propensities as are stated to belong to one of its congeners, nor consequently are its haunts entirely avoided by the smaller species of true Bat (*Vespertilio* proper) though the numerousness of its own race leaves not much room for the intrusion of strangers; that the males and females dwell together promiscuously even when the females are gravid and nearly parturient, and therefore probably always; that the young are seemingly driven away so soon as they can shift for themselves, all those taken by me having been well grown; that the females bring forth in spring and perhaps also in autumn, the latter point resting on information, the former on the fact that all my females were, on the 26th February found variously, but far, advanced in their pregnancy; that the males are more numerous than the females in a high proportion, or from  $\frac{1}{3}$  to  $\frac{1}{2}$  more; that the females bring forth only a single young one at a time, not one instance of double gestation occurring among my numerous specimens; and, lastly, that no other species dwells mixedly with this *Megaderme*, though a species of true Bat of diminutive size was found tenanted the same house, and the two were observed to issue forth at night from their respective and distinct domiciles simultaneously, and so as constantly to cross each other in their flight, a flight sustained by both with equal power, yet without any aggression of the larger on the smaller kind.

Having said so much of the manners of our animal I proceed to its form and structure, merely premising that I think it is a true *Megaderme*, although its phalangial system is apparently irreconcilable with Cuvier's general or Geoffroy's particular definitions in that respect,\* for it has two bony phalanges to the thumb, two also to the index, and three to each of the remaining fingers. In other respects it is a complete *Megaderme* and a striking exemplar of a Genus of Bats, which, though diffused throughout the plains of India, is absolutely unknown in the mountains, at least on the sub-Himalayas. The *Megadermes*

\* See *Regne animal*, Vol. II, pp. 7 and 10, Vol. V. p. 74, *Nat. Libr.* Vol. XII. I, p. 123, and Vol. VII. p. 74. So far as my observation of the Family of Bats goes the phalangial system of our specimen is unique, and, should it prove so, the type might be denominated *Eucheira*.



appear to be found all over the plains of India and its islands, extending thence to Africa; and wherever found they are as numerous in individuals as scant in species, only three distinct kinds being yet recorded, notwithstanding the immense geographic diffusion of the Genus. The subject of the present paper is however, I believe, a novelty, and to the careful description of it I now proceed.

The Slaty Magaderme of the Tarai is  $3\frac{1}{2}$  inches long from snout to vent, the head, to the occiput,  $1\frac{1}{4}$ , the ear to the lobe,  $1\frac{1}{2}$ , the caudal membrane (for there is no tail)  $1\frac{1}{2}$ , the arm  $1\frac{1}{2}$ , the forearm  $2\frac{1}{2}$ , the longest finger 5, the thigh  $1\frac{3}{8}$ , the leg  $1\frac{3}{8}$ , the planta and nails,  $\frac{3}{4}$ , the expanse 18, and the weight 2 oz. Sex makes no difference in size or aspect, and immaturity, after the growth is well advanced, little or none. The colour of the fur is, for the most part, a clear deep slaty blue above and sordid buff below, of the membranes deep brown, and of the eye, very dark. Females resemble males. Juniors have the slaty hue less pure or smared with brown. The moderate-sized and depressed head ends bluffly to the front, where the simple and adpressed lips are covered with downy piles and short divergent hairs, except in front of the lower lip which is nude and faintly grooved. Two moderately large and roundish plates are laid flat on the nose, one above and the other below the ovoid nares, which lie hid completely between them. The upper plate becomes at the base of the bridge of the nose somewhat narrowed, and then is continued into an erect free process, more or less concave, and divided longitudinally by a central ridge; the shape of the process being elliptic. The eyes, which have a backward and laterally remote position, are small, but still larger considerably than in the Bats proper or in the Rhinolpbes, though less so than in the Pteropines. The immense nude and rounded ears have their bases low down and forward, so as nearly to pass under the eye, where there is a vague antitragal development, and immediately above it, but quite distinct, rises the inner ear consisting of an acute spire, and a small rounded process, in line with it, which latter is sometimes notched on its round edge. The true ears are united over the forehead above half way to their tips and of course can therefore have very little mobility. Nor do the ears exhibit any of that exquisite sensibility for which the ears of the Rhinolpbes are so remarkable. The body is muscular and strong with a large sternal keel or crest, and is covered abundantly with

silky hair of one kind that is laxly applied to the skin, and more or less wavy in some specimens, smooth in others. The flying apparatus, or alar and caudal membranes, are very ample, the latter being extended to the heel or tarse, and so as, when expanded, to run straight across from heel to heel. The alar membrane commences at the centre of the forearm's length, takes in the first joint of the thumb, makes a large angle so as to envelope the long mid-finger, and then passes pretty evenly to the heel. There is no trace of tail, nor any caudal vertebræ. The thumb has two equal bony joints, whereof the first is enveloped in membrane and the second free and nailed as usual. The index has one entire joint and a second rudimental, which however is half an inch long nearly, and all the other digits have three complete bony phalanges each. There are two pectoral and two inguinal teats, whereof the latter are the larger and bear more appearance of having been sucked. The penis is pendant: the tests internal: the womb simple; there is no frontal sinus: stomach purely membranous and globose, with proximate orifices: intestines from 11 to 14 inches, of pretty equal calibre, and having a grain-like cœcum,  $\frac{1}{8}$  inch long, at 1 to  $1\frac{1}{2}$  inches from the anal end of the gut: great arch of stomach 3 to  $3\frac{1}{2}$ ; lesser  $\frac{1}{2}$  to  $\frac{3}{4}$ : Lungs 2-lobed: Liver 2-lobed, each subdivided, and a lobulus: Gall-bladder grain-like (size and shape of a grain of finest rice) and freely suspended in the cleft of the largest lobe of the liver. Contents of stomachs, insect remains solely: of uteri, single young, much advanced in growth, with all the organs formed and the mouth open, but quite nude. The skull, the walls of which are as thin as paper, is much curved culmenally and very ample in dimensions in all the regions of the brain: the crests, longitudinal and transverse, small but traceable: the frontals flat, short and laterally bounded by sharp ridges: the nasals,\* wanting: orbits large and very incomplete: auditory cavities double: lower jaw straight with very low condyles. Teeth  $\frac{0}{4}$ :  $\frac{1}{1}$ :  $\frac{1}{1}$ :  $\frac{4}{5}$ :  $\frac{4}{5}$ . No trace of incisors in the upper jaw, nor of any bone or cartilage to sup-

\* The deficient bones are apparently not merely the intermaxillars but the nasals, of which there is no trace, and the cavity in front of the skull is consequently very large. However in all the 7 specimens now before me the cranial sutures are well nigh or wholly obliterated. Quere? Are not the nasal bones wanting in all the typically istio-phorous Bats? for, if not, how could the complex and delicate external apparatus of the nose have the requisite freedom of communication with the nervous and circulating systems, there being no special orifices observable in the malars or frontals. In fact, the ant-orbital foramina are very small in these Bats, and I have noticed no others.

port them ; lower incisors pressed between the canines and denticulate on their crowns : laniaries large, curved, angular, with spiculate processes before and behind at their base : molars purely insectivorous, their crowns bristling with spikes and filling the entire space from the laniaries to the postea edge of both jaws. Tongue moderately extensile and simple.

The following are the dimensions in detail of a fine mature specimen :—

|                            |   |     |                |
|----------------------------|---|-----|----------------|
| Expanse of wings . . . . . | 1 | 6   | 0              |
| Snout to vent. . . . .     | 0 | 3   | $\frac{1}{2}$  |
| Tail . . . . .             | 0 | 0   | 0              |
| Caudal membrane . . . . .  | 0 | 1   | $\frac{1}{2}$  |
| Head to occiput, . . . . . | 0 | 1   | $\frac{1}{4}$  |
| Length of ears . . . . .   | 0 | 1   | $\frac{1}{2}$  |
| Width of ears . . . . .    | 0 | 0   | $\frac{7}{8}$  |
| Brachium . . . . .         | 0 | 1   | $\frac{1}{2}$  |
| Cubitus . . . . .          | 0 | 2   | $\frac{9}{16}$ |
| Long finger . . . . .      | 0 | 5   | 0              |
| Femur . . . . .            | 0 | 1   | $\frac{3}{8}$  |
| Tibia . . . . .            | 0 | 1   | $\frac{3}{8}$  |
| Planta and nails . . . . . | 0 | 0   | $\frac{3}{4}$  |
| Weight . . . . .           | 2 | oz. |                |

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On a New Species of Plecotus ; by the same.

I have just obtained, for the first time, a sample of the genus *Plecotus*, and one very nearly allied to the common English type so admirably described by McGillivray in the VII. Vol. of the Nat. Lib. p. 85—90. My specimen was taken in the central region of the mountains, in a dwelling house, where it was attracted at night by the lights, and after a chase of above half an hour's duration, during which the extraordinary volant powers of this Bat several times caused its

pursuers to despair of success in taking it. It flew unweariedly, turned with the rapidity of a butterfly, and alighted and rose again as readily as that active insect. It is a male and mature.

Plecotus homochrous, mihi. Snout to vent $1\frac{7}{8}$ inches. Head $\frac{5}{8}$. Tail $1\frac{3}{4}$. Expanse 10. Weight less $\frac{1}{2}$ oz. Ears from antea base $1\frac{1}{2}$. From postea $1\frac{3}{8}$. Arm $1\frac{3}{8}$. Forearm $1\frac{7}{8}$. Mid finger $2\frac{5}{8}$. Femur $\frac{5}{8}$. Tibia $\frac{5}{8}$. Planta and nails $\frac{5}{16}$. Colour, uniform obscure brown. Fur, silky and short, internally black, externally brunescent above, flavescent below, but obscurely in both cases. Membranes dusky brown. Iris saturate brown. Head depressed. Nose medial, depressed, with a central groove in both skin and scull. Nares, angulo-elliptic, large, supernal, with a swollen margin. Lips simple. Eye prominent, large for a true Bat, and nearer ear than snout. Forehead not raised. Ears enormous, $2\frac{1}{2}$ of head, elliptic, nude, transversally striolate. Antea edge of helix, half reflected, flat, smooth, and ending below in a sacculus and salient knob. Inner ear narrow, pointed, erect, with a small basal process for tragus, answering which is a small internal antitragus. Ears remote, low down, touching with proximate edges over the forehead, but *not* united there. Tongue simple and not extensile. Teeth $2:2$ $\frac{1}{1}:\frac{1}{1}$. $\frac{4}{5}:\frac{4}{5}$. Wings ample, the membrane commencing from shoulder almost, and taking in the wrists, first phalanx of thumb, and the metatarses as well as tarse, and enveloping all the long tail. Thumb 3 jointed. Index 1. Mid-digit 4. Annular and small each 3. Tail 7 jointed, long and pointed, the mere tip free. No teats traceable on chest or groin. Intestines $5\frac{1}{2}$ inches, thin coated and fragile, wider above, gradually narrowing. No cæcum. Stomach membranous, hemispheroidal, with terminal orifices. $1\frac{3}{4}$ by $\frac{5}{16}$ inches along greater and lesser arches.

HABITAT.—Central region of sub-Himalayas.

REMARK.—Nearly allied to *Auritus*, but differs therefrom by dissimilar ears, fewer molars, a flat inner ear, shorter fur, and nude ears, besides its more uniform colour. The joints of the digits also differ, showing how little dependance can be placed upon this mark which yet Cuvier, Geoffroy and H. Smith make the corner-stone of their general classification of the Family!

I subjoin a synopsis of the several species thus far ascertained.

VESPERTILIONIDÆ.

PTEROPINÆ.

Pteropus. 1. *edwardsii* v. *medius*.

Cyanopterus. 1. *marginatus*.

Habitat, Terai. Passengers in Hills.

RHINOLOPINÆ.

Rhinolophus. 1. *perniger*. 2. *macrotis*. 3. *tragatus*.

Hipposideros. 1. *armiger*. 2. *subbadius*.

Habitat, Central Hills.

Megaderma. 1. *schistacea*.

Habitat, Tarai.

VESPERTILIONINÆ.

Vespertilio. 1. *muricola*. 2. *pallidiventris*.

Kerivoula. 1. *formosa*.

Scotophilus. 1. *fuliginosus*.

Noctilinia. 1. *labiata*. 2. *lasyura*.*

Plecotus. 1. *homochrous*.

Habitat, Central Hills.

Total—15 species.

* N. B. This is an undescribed species with the general structure of *labiata*, but distinguished remarkably by having the entire legs and caudal membrane clad in the fur of the body, which is thick and woolly. Colour bright rusty above, sooty below; the hairs tipt hoary. Digits rusty. Membranes blackish. Snout to rump $2\frac{1}{2}$ inch. Head $\frac{1}{16}$. Ears $\frac{1}{16}$. Tail $1\frac{3}{4}$. Expanse 13 inches. Arm $1\frac{1}{8}$. Forearm $1\frac{3}{4}$. Long finger $3\frac{1}{4}$. Head depressed. Eyes and ears remote. Eyes small. Ears moderate rounded. Inner ears spire-shaped. Nostrils lateral-salient. Cheeks tumid. Thumb with 3 joints. Index with 2. Mid with 4 and a cartilaginous appendix. Annular and small digits each with 3. Tail ample, 7 jointed, and nearly square. Teeth all remarkably blunt. Penis with a corneous tip ending in two horn-like crura. Helix postecally with a sacculate reduplication, but no prolongation towards the gape as in *labiata*. Intestines $7\frac{1}{2}$ inches. No cœcum. Stomach hemispherical with terminal orifices.

CATALOGUE OF REPTILES

*Inhabiting the MALAYAN PENINSULA and ISLANDS,**Collected or observed by THEODORE CANTOR, Esq., M. D., Bengal Medical Service.*

(Continued from No. CLXXX.)

OPHIDIA.

INNOCUOUS SERPENTS.

FAM. TYPHLOPIDÆ, GRAY.

BURROWING.

GEN. PILIDION, *Duméril and Bibron.*

Head covered with shields, cylindrical, very short, as if truncated, convex above, declivous in front; muzzle rounded; rostral shield like a large rounded cap covering the head and muzzle; an anterior frontal, a frontal, a pair of supra-orbital, ocular, nasal, and fronto-nasal shields; neither parietals, inter-parietals, nor præ-orbitals; nostrils hemispherical, under the muzzle, between the nasal and fronto-nasal shields; eyes excessively small, hidden by the ocular shields.

PILIDION LINEATUM, (Boie.)

SYN.—*Acontias lineatus*, Reinwardt, MS.*Typhlops lineatus*, H. Boie.*Typhlina*, Wagler.*Typhlops lineatus*, Gray in Griffith, A. K.*Typhlops lineatus*, Schlegel.*Pilidion lineatum*, Duméril and Bibron.*Typhlinalis lineatum*, Gray: Catal.

Ground-colour pale gamboge or orange, uniform on the head, the apical third of the tail, and the abdomen; interrupted on the back and sides by 12 longitudinal, serrated brown lines, produced by a minute triangular spot on each side of the scales.

HABIT.—*Pinang Hills.*

Java, Sumatra, Singapore.

A single individual, captured by Sir William Norris, differs from the description given by M. M. Duméril and Bibron in the comparatively

greater dimensions of the tail. It is strongly arched; its length equals twice the breadth of the head; it is covered with 16 transversal series of scales, and it is considerably thicker than the rest of the uniformly cylindrical body. The anterior frontal shield is very broad, larger than the frontal. It was of the following dimensions:—

Length of the head,	0 feet	$0\frac{2}{8}$	inch.
Ditto ditto trunk,	1	$0\frac{7}{8}$	
Ditto ditto tail,	0	$0\frac{4}{8}$	
	<hr/>		
	1 ft.	$1\frac{5}{8}$	inch.

Circumference of the trunk $\frac{5}{8}$ inch; of the tail $\frac{6}{8}$ inch.

GEN. TYPHLOPS, *Schneider*.

Head covered with shields, depressed; muzzle rounded, covered above and beneath by the rostral shield; an anterior frontal, a frontal, a pair of supra-orbitals, one or two pairs of parietals and inter-parietals; a pair of nasals, fronto-nasals, præ-orbitals and oculars; nostrils lateral, hemispherical, opening in the suture between the nasal and fronto-nasal; eyes lateral, more or less distinct; pupil round.

TYPHLOPS NIGRO-ALBUS, *Duméril and Bibron*.

SYN.—*Argyrophis bicolor*, Gray: Catal.

Shining black above; on the head some transversal and radiating whitish yellow lines; scales of the back edged with white; beneath whitish yellow.

HABIT.—*Pinang Hills, Singapore*.

Sumatra.

This species is closely allied to *T. diardi*, Schlegel,* an inhabitant of Assam and the Khassia Hills. Of two individuals observed, the larger was of the following dimensions.

Length of the head,	0 feet	$0\frac{4}{8}$	inch.
Ditto ditto trunk,	1	0	
Ditto ditto tail,	0	$0\frac{3}{8}$	
	<hr/>		
	1 ft.	$0\frac{7}{8}$	inch.

Circumference of the trunk $\frac{7}{8}$ inch, of the tail $1\frac{1}{8}$ inch.

* SYN.—*T. diardii*, apud Dum. and Bibr.—*Argyrophis horsfieldii*, Gray: Catal.

TYPHLOPS BRAMINUS, (Daudin.)

SYN.—L'Orvet lombric, Lacépède.

Anguis. Rondoo Talooloo Pam. Russell, I. Pl. 43.

Punctulated Slow-Worm, Shaw.

Eryx braminus, Daudin.

Typhlops rondoo talooloo, Cuvier.

Tortrix russelii, Merrem.

Typhlops braminus, apud { Cuvier.
Fitzinger.
Gray in Griffith, A. K.

Typhlops russelii, Schlegel.

Typhlops braminus, Cuvier, apud Duméril and Bibron.

Argyrophis bramicus, Gray: Catal.

Shining copper-coloured, or brown of various shades above, paler beneath. Some individuals of a uniformly bluish white. All the scales with a dark brown spot at the anterior part. The shields of the head have a whitish line close to their margins. In the young the latter is crenulated, and the sides of the head, lips, throat, the anal region, and the point of the tail are yellowish or whitish, and the body is semitransparent.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Canton-Province, Philippines, Guam (Marian Isles,) Java, Tenasserim, Bengal, Assam, Coromandel, Ceylon, Malabar.

In the Malayan countries this species is numerous in hills and valleys. The eyes are black, the pupil round, which is also the case in *T. nigro-albus*. The largest of a great number examined was of the following dimensions:—

Length of the head,	0 $\frac{3}{8}$ inch.
Ditto ditto trunk,	7 $\frac{2}{8}$
Ditto ditto tail,	0 $\frac{1}{8}$
	<hr/> 7 $\frac{6}{8}$ inch.

Circumference of the neck $\frac{4}{8}$ inch; of the tail $\frac{5}{8}$ inch.

The preceding species of this family are all of similar habits. They mostly live under ground, but appear occasionally in shady places, particularly after showers of rain, in Bengal, in the rainy season. They are very agile, and appear to make use of the horny point of the tail as a propeller. When taken, they frequently press it against the hand in their attempts to escape. Reposing on the ground *Typhlops bra-*

minus may easily be mistaken for an earthworm, until its serpentine movements, the darting of the white furcated tongue, while the head and neck are raised, make it known. In confinement they refuse food and water. In all dissected, the stomach contained some earth; in a few, remains of insects, (myriapoda, ants.) A young female had a string of six cylindrical soft eggs, of a yellowish white colour, each about $\frac{2}{8}$ of an inch in length, $\frac{1}{16}$ in diameter.

FAM. BOIDÆ, BONAPARTE.

BURROWING.

GEN. CYLINDROPHIS, *Wagler*.

Scales smooth, imbricate, hexagonal; those of the abdomen broader than the rest; nostrils subvertical, opening in the lower part of the anterior frontal shield; neither nasals, frenals, nor præ-orbitals; a single post-orbital; frontals large, reaching the minute eye, and the large 2nd and 3rd labials; supra-orbitals, occipitals and vertical distinct; tail very short.

CYLINDROPHIS RUFUS, (Laurenti.)

SYN.—*Anguis rufa*, Laurenti, apud { Gmelin.
Schneider.
Shaw.

Anguis striatus, Gmelin.

Anguis scytale, Linné, apud Russell, II. Pl. 27.

Shilay Pamboo, Russell, II. Pl. 28 (young.)

Anguis corallina, Shaw.

Eryx rufa, Daudin.

Tortrix rufa, Merrem, apud { Gray.
Schinz.
Schlegel.
Filippi.

Scytale scheuchzeri, Merrem.

Ilysia rufa, Lichtenstein, apud Fitzinger.

Cylindrophis resplendens, Wagler.

Cylindrophis rufa, Gray, apud Duméril and Bibron.

Iridescent blackish brown above, beneath with alternate black and yellowish white transversal bands or interrupted bars. Iris black, pupil vertically contracted by the light; tongue whitish. Central series of abdominal scales 206; subcaudal 6.

HABIT.—*Singapore*.

Java, Tranquebar, Bengal. (?)

A single individual, turned up with the earth in a garden at Singapore belonging to Dr. Montgomerie, differs from the description

given by M. M. Duméril and Bibron in the following particulars. The head is uniformly black, without the two scarlet frontal spots; the apex of the tail whitish; the posterior part of the body is more robust than the anterior; the length of the head forms more than $\frac{1}{3}$ of the entire length of the animal; there are six pairs of labial shields on each jaw, and the scales of the trunk are disposed in 20 longitudinal series. It unites characters assigned by M. M. Duméril and Bibron as distinguishing *Cylindrophis rufus* from *C. melanotus*, Wagler, and it would therefore appear that Dr. Schlegel is justified in considering the latter from Celebes (*Tortrix melanota*, Boie, MS.) as a variety of *rufa*. In the present individual there is no external appearance of the very rudimentary anal hooks. It was slow in its movements, attempted to escape, but not to bite.

Length of the head,	0 feet 0 $\frac{4}{8}$ inch.
Ditto ditto trunk,	1 6 $\frac{2}{8}$
Ditto ditto tail,	0 0 $\frac{3}{8}$
<hr/>	
1 ft. 7 $\frac{1}{8}$ inch.	

GEN. XENOPELTIS, Reinwardt.

Head rather narrower than the trunk, depressed, obsoletely angular; eyes small, round; nostrils large, apical; frenal shield very large; præ-orbital none;* post-orbitals three;† interparietal very large, equalling the vertical; trunk thick, short with imbricate smooth hexagonal scales, disposed in longitudinal series, increasing in size towards the narrow abdominal scuta; tail thick, short, awl-shaped, beneath with scutella.

XENOPELTIS UNICOLOR, Reinwardt.

SYN.—*Xenopeltis concolor*, Reinwardt.

Xenopeltis leucocephala, Reinwardt (young.)

Guerin: Iconog. Pl. 21, Fig. 3.

Tortrix xenopeltis, Schlegel.

Adult.—Blackish or reddish brown above with strong metallic blue, purple, and green lustre; lips and throat buff; the lowest lateral series

* The single præ-orbital is very large, the frenal small, sub-rectangular; the nostrils open between the latter and the nasal shield.

† Three individuals examined, presented two post-orbitals.

of scales, scuta and scutella pale reddish brown with broad whitish margins. Iris black; pupil lanceolate with the apex downwards, vertically contracted by the light; tongue buff.

Young.—Head yellowish white with a brown spot on the crown and labial shields; the scales of the sides edged with white, producing longitudinal zig-zag lines; the two lowest series of scales and scuta yellowish white; scutella of the same colour with a brown transversal line.

Scuta 175 to 179, Scutella 26 to 27.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Celebes, Java, Sumatra.

Of three young individuals, one was found by Sir William Norris on the Great Hill at Pinang, a second by Dr. Montgomerie at Singapore, and a third was obtained in Province Wellesley, where also a single adult male was killed. As this serpent in general appearance bears a strong resemblance to *Lycodon aulicus*, (Linné) (Syn. *L. hebe*, apud Schlegel), so it also does in its fierce habits, and mode of attack. The scales are smooth, rhombic-hexagonal, disposed in 15 longitudinal series. Labial shields $\frac{8}{8}$ - $\frac{8}{8}$. The stomach of a young individual examined, contained the remains of a rat. The adult attains to a much larger size than supposed: a male was of the following dimensions:

Length of the head,	0 feet.	$1\frac{4}{8}$ inch.
Ditto ditto trunk,	3	$2\frac{3}{8}$
Ditto ditto tail,	0	4
	<hr/>	
	3 ft.	$7\frac{7}{8}$ inch.

Circumference of the neck $2\frac{6}{8}$, of the trunk $4\frac{2}{8}$, of the root of the tail 2 inch.

TERRESTRIAL.

GEN. PYTHON, *Daudin*.

Entire shields under the abdomen and tail, the latter cylindrical, sometimes with scutella; anus with scales and a hook on each side.

PYTHON RETICULATUS, (Schneider.)

SYN.—Seba I, Tab. 62, Fig. 2; II. Tab. 79, Fig. 1. and Tab. 80. Fig. 1.

Ular sawa, Wurmb.

La jaune et bleue Lacépède.

L'oularsawa, Bonnatere.

Boa reticulata, Schneider, apud Daudin.

Boa rhombeata, Schneider. (?)

Boa amethystina, Schneider.

Boa constrictor, Var e, Latreille.

Boa phrygia; Shaw.

Coluber javanicus, Shaw.

Boa constrictor, Var 5, Daudin.

Python amethystinus, Daudin.

Python des îles de la Sonde.

Python schneiderii, Merrem, apud { F. Boie.
Guerin.
Schlegel.

Coluber javanensis, Fleming.

Python javanicus,* Kuhl, apud { Fitzinger.
Gray in Griffith, A. K.
Eichwald.

Constrictor (*P. schneideri*, Khul) Wagler.

Python reticulatus, Gray, apud Duméril and Bibron.

"Ular sawa" of the Malays.

Ground-colour above light yellowish-brown, chestnut or olive-green, assuming a greyish hue on the sides, all the colours strongly iridescent, particularly reflecting metallic blue, or green. The head is divided from the muzzle to the nape of the neck by a black line, continued along the back to the point of the tail and describing a series of large lozenges, sometimes linked to each other by a small black ring, sometimes broken up into large irregular patches. A black oblique line proceeds from behind the eye towards the angle of the mouth, continuing on the sides as a series of more or less regular lozenges, which are joined to the lateral angles of those of the back by a large black triangular spot with a white arched mark in the centre. The scales nearest the black margins of the lozenges are of a lighter colour than the rest, sometimes whitish. Between and within the lateral lozenges appear numerous black spots, or interrupted lines. The lips (the lower in some present a black line), and abdominal scuta are gamboge, or pale yellow, as well as the lowest two or three series of scales, but the latter with irregular black spots. The caudal scutella, and scuta, when present, are yellow, marbled with black. The iris is silvery flesh-coloured or yellowish-brown, sometimes with a black bar; the pupil vertically contracted by the light. The tongue is black above, bluish white beneath. In the young the colours are brighter than in the adult.

Scuta 297 to 330; Scutella 82 to 102.

* *Python javanicus*, figured and described in Abel's Narrative, &c., is *Python molurus*, (Linné.)


HABIT.—*Malayan Peninsula and Islands.*

Chusan ?* Amboina, Java, Banka, Sumatra, Bengal ? 

The two fossets of the rostral shield are pyriform with the apex diverging, and those of the nearest 3 or 4 upper labials are of similar shape. The inferior fossets are square, occupying the lower margin of the shield, varying from 7 to 9 on each side. The foremost of these is situated on the shield corresponding to that of the upper jaw, which borders the orbit.

This species is very numerous in the Malayan hills and valleys, feeding upon quadrupeds and birds. It often takes up its abode in out-houses, preying at night, and is thus useful in destroying vermin, although plunder is occasionally committed in poultry yards. Dr. Montgomerie has seen in George Town, Pinang, a young one which the inhabitants suffered to retain unmolested possession of the rice stores in order to secure them against the ravages of rats. Individuals of 16 ft. in length are of no rare occurrence. In 1844 one was killed at the foot of Pinang, which a gentleman informed me measured more than 30ft. During the expedition to China in 1840 one was shot from the poop of one of H. M. Transports, then riding in Singapore roads, between 3 and 4 miles from the shore. It was about 9ft. long, and had the upper part of the head infested with *Ixodes ophiophilus*, Müller. The Chinese attribute great medicinal qualities to the heart and the gall-bladder, and use the skin to cover the bodies of some of their musical instruments. *Python molurus*, (Linné,) *Pedda Poda*, Russell, I. Pl. 22, 23, 24, and *Bora*, Pl. 39, is said also to occur, but rarely, in the Malayan Peninsula, but I never had an opportunity of seeing it.

* Skins are of frequent occurrence at Chusan, and the natives assert that the serpent is found there and on the neighbouring continent. Serpents from 14 to 16 feet in length, "Rock-snakes," were observed by several officers during our occupation of the island.

 M. M. Duméril and Bibron state that this species has been sent from Bengal by M. A. Duvaucel. The natives are not acquainted with it, and the specimens in the Museum of the Asiatic Society are from Pinang. The living animal is occasionally brought from the Straits of Malacca to Calcutta, and such is probably the history of the specimen sent from Bengal by M. Duvaucel. *Python molurus*, (Linné,) (*Pedda Poda* and *Bora* of Russell,) is very numerous in Bengal.

AQUATIC.

GEN. ACROCHORDUS, *apud Schlegel.*(*Acrochordus*, Hornstedt, 1787.—*Chersydrus*, Cuvier, 1817.)

Acrochordus, Hornstedt. Nostrils vertical, eyes encircled by a ring of minute scales; trunk compressed, attenuated towards both extremities; tail tapering, compressed; all the scales small, trifid, strongly keeled.

ACROCHORDUS JAVANICUS, Hornstedt.

SYN.—*Acrochordus javanicus*, *apud Shaw.**Acrochordus javensis*, Lacép. *apud Cuvier.**Acrochordus javanicus*, *apud Schlegel.*“*U'lar károng*, or *sápi*, or *lembu*” of the Malays.*

Young. Above dull greyish-brown; sides and lower parts pale yellow, or dirty ochre; back with 3 longitudinal, undulating, frequently interrupted black bands; sides and abdomen with rows of rounded spots, marbled and dotted with black.

Adult. Of similar, but less distinct colours. Iris brown, pupil elliptic, vertically contracted by the light; tongue whitish.

HABIT.—*Pinang, Singapore.*

Java.

A female captured on the Great Hill at Pinang, at a distance from water, was of the following dimensions:

Length of the head,	0 ft.	14	inch.
Ditto ditto trunk,	4	7	
Ditto ditto tail,	0	9	
	5ft.	54	inch.

Greatest circumference one foot.

Notwithstanding the sharply compressed abdomen, the serpent moved without difficulty, but sluggishly on the ground, and preferred quiet. When touched she attempted to bite, but the pupil being contracted by the glare, she missed her aim. Shortly after being brought, while the rest of the body remained motionless, the posterior ribs were observed moving, and the serpent successively, in the course of about 25 minutes, brought forth twenty-seven young ones. Each birth was

* *U'lar* signifies a serpent, *károng* a sac; *sápi* and *lembu* a cow or ox. These expressive vernacular names refer to the loose skin, and the bulk of the animal.

followed by some sanguinolent serum. With two exceptions the fœtus appeared with the head foremost. They were very active, bit fiercely, and their teeth were fully developed. Shortly after birth the integuments came off in large pieces, which is also the case with the fœtus of several species of *Homalopsis*. The present ones were placed in water, which however appeared to distress them, as they all attempted to escape on dry ground. Nearly all were of the following dimensions :

Length of the head,	0 ft.	$0\frac{6}{8}$	inch.
Ditto ditto trunk,	1	$1\frac{2}{8}$	
Ditto ditto tail,	0	3	
	<hr/>		
	1ft.	5	inch.

The Malays of Pinang assert that this species is of very rare occurrence. During a residence of 20 years at Singapore, Dr. Montgomerie observed it but in a solitary instance. The physiognomy of this species bears a striking resemblance to that of a thorough-bred Bulldog, which in a somewhat less degree also may be said of the following.

Sub-Gen. Chersydrus,* Cuvier. Head and body uniformly covered small scales.

ACROCHORDUS GRANULATUS, (Schneider.)

SYN.—Hydrus granulatus, Schneider.

Angvis granulatus, Schneider.

Acrochordus fasciatus, Shaw.

Acrochordus dubius, Shaw.


Pelamis granulatus, Daudin.

Chersydrus (A. fasciatus, Shaw), Cuvier.

Acrochordus fasciatus, apud Raffles.

Chersydrus granulatus, Merrem, apud Wagler.

Acrochordus fasciatus, apud Schlegel.

“U'lar limpa,”  or “U'lar laut” of the Malays.

Young. Blackish-brown or liver-coloured; the head with a few scattered yellowish-white spots, the rest of the body with numerous rings of the latter colour, some interrupted on the back, others on the abdomen.

* This Sub-Gen. was founded upon the erroneous supposition that *Acrochordus fasciatus*, Shaw, possessed venomous organs.

 *Limpa*, i. e. liver, liver-coloured.

Adult. The dark colours fade to a dull greyish black, uniform on the back, and the sides and abdomen present alternate dark and whitish vertical bands. Iris black, pupil vertically contracted; tongue whitish.

HABIT.—*Rivers and sea-coast of the Malayan Peninsula and Islands.*

Bay of Manilla, New-Guinea, Timor, Java, Sumatra, Coromandel.

This species appears not to exceed about 3ft. in length. The body is less bulky and the skin less loose than in *A. javanicus*. But the form is more compressed, particularly the sword, or oar-like tail, and like that of the pelagic venomous serpent, appears exclusively calculated to aquatic habits. The scales also resemble those of the latter, and are generally smaller than in *A. javanicus*. Those of the back, the largest, are rounded rhombic, each with a minute tubercle in the centre. The skin in the interstices is finely wrinkled. On the abdomen the scales are mucronate, with a sharp, reclining central point. In both species the medial line is raised by 2 or 3 quincunx rows of scales with their points overlapping each other. The orbit is surrounded by a ring of scales a little larger than the rest. The nostrils, pierced high up on the muzzle, are almost vertical, slightly more so than they are in *A. javanicus*. In both they are tubular, larger in the present species, sinuous, and provided with a deeply seated membranous fold, which can hermetically close the passage. The mouth is secured in a similar manner by a central arched notch and two lateral protuberances, which correspond to a protuberance and two lateral cavities in the lower jaw. This contrivance also occurs in *Hydrus*, and to a certain extent in *Homalopsis*. With the exception of the dentition and the absence of venomous organs, in anatomical details both species of *Acrochordus* closely resemble *Hydrus*. As observed by M. Schlegel, the most striking feature is the great development of the lung, which occupies nearly three-fourths of the extent of the abdominal cavity. A somewhat similar arrangement also occurs in *Homalopsis*. All the maxillary teeth (inter-maxillary none) are strong, pointed, inwardly reclining and disposed in double or treble rows. The 3 anterior teeth are the shortest: the upper jaw has on each side upwards of 20 teeth, the lower 3 or 4 less. The palatal teeth number 12 on each side, the pterygoid 9, and are shorter than the rest. *Acrochordus granulatus* is of no rare

occurrence in the sea of the Malayan coasts, although, according to Raffles, it is rarely seen on the coasts of Sumatra. At Pinang they are found among the fishes, taken in the stakes some 3 or 4 miles distant from the coast. M. Schlegel is mistaken in stating that this species never inhabits the sea,* and in censuring M. Eschscholtz for his stating that the fishermen often take it in the Bay of Manilla. A female of the following dimensions had six eggs:—

Length of the head,	0 feet	$0\frac{6}{8}$	inch.
Ditto ditto trunk,	2	$7\frac{2}{8}$	
Ditto ditto tail,	0	$3\frac{6}{8}$	
<hr/>			
	2 ft.	$11\frac{6}{8}$	inch.

Greatest circumference, 4 inches.

The egg is cylindrical, soft, coriaceous, whitish, about $1\frac{1}{2}$ inch in length. In each egg was coiled up a living young one of the following dimensions :

Length of the head,	$0\frac{3}{8}$	inch.
Ditto ditto trunk,	9	
Ditto ditto tail,	$1\frac{4}{8}$	
<hr/>		
	$10\frac{7}{8}$	inch.

Greatest circumference, 1 inch. In food and general habits this species resembles the pelagic, venomous, serpents; in its element, it is active, but on dry, blinded by the daylight, it is sluggish and of uncertain movements.

FAM. COLUBRIDÆ, BONAPARTE.

TERRESTRIAL.

GEN. CALAMARIA, *H. Boie*.

Body diminutive, elongated, obtuse at both extremities, throughout of equal diameter, cylindrical; eyes very small with round pupil; frontals one pair, laterally extending to the labials; frenals none; nostrils lateral, opening in a small shield between the frontal, rostral and anterior labial; one præ-orbital, one post-orbital, four mental shields; dorsal scales rhombic, polished, smooth; tail very short.

CALAMARIA LUMBRICOIDEA, Schlegel, VAR.

SYN.—*Calamaria lumbricoidea*, Boie, MS.

Calamaria virgulata, Boie, MS. (Young.)

* *Essai*, &c. p. 492.

Strongly iridescent, brownish-black, lighter on the head, scales with whitish edges; cheeks, lips and throat citrine; the lowest row of scales and abdominal surface yellowish white; sub-caudal scutella faintly marked with brown; eyes and tongue black.

Scuta 169; Scutella 26.

HABIT.—*Pinang, Singapore.*

Celebes, Java.

This variety differs in nothing but colours from the species described by M. Schlegel. Of three individuals observed, two were taken by Sir W. Norris and W. T. Lewis, Esq. in the hills of Pinang, the third by Dr. Montgomerie at Singapore. The largest was of the following dimensions:

Length of the head, $3\frac{3}{8}$ inch.

Ditto ditto trunk, $11\frac{6}{8}$

Ditto ditto tail, $1\frac{3}{8}$

1 ft. $1\frac{4}{8}$ inch.

Circumference $\frac{6}{8}$ inch.

The livery bears a remarkable resemblance to that of *Calamaria alba* (Linné), (*C. brachyorrhos*, Schlegel,) from which it however differs in the absence of the anterior frontal shields, and in having 13 instead of 17 longitudinal series of scales.

CALAMARIA LINNEI, H. Boie, VAR. Schlegel.

SYN.—*Calamaria reticulata*, Boie, MS.?

Changulia albiventer, Gray: Ill. Ind. Zool. Pl.—Fig. 6—9.*

Calamaria linnei, Var Schlegel.

Adult. Head brown, minutely dotted with black, lips and cheeks pale gamboge; trunk reddish brown, on each side with two vermilion longitudinal bands with black serrated edges; beneath carmine with a black serrated line on each side; subcaudal scutella with a central black, zig-zag line; all the colours strongly iridescent; eyes black, tongue vermilion.

Young. Like the adult, but with a broad black nuchal band, edged

* Referred by M. Schlegel to *C. lumbricoidea*, but the characteristic distribution of the colours is that of the present *Var.* The figure however is not good, and not coloured from life.

with white, a vermilion band at the root of the tail, and in some a similar near the point.

Scuta 166, Scutella 17.

HABIT.—*Pinang*.

Java.

The present variety corresponds in all particulars to the description of *C. linnei* by M. Schlegel, who however does not mention that the two or three anterior teeth on each side of the lower jaw are longer than the rest. Of six individuals from the hills of Pinang the largest individual measured

Length of the head,	0 $\frac{2}{8}$ inch.
Ditto ditto trunk,	10 $\frac{1}{8}$
Ditto ditto tail,	0 $\frac{5}{8}$
	<hr/> 11 inch.

Circumference of the neck $\frac{3}{8}$, of the trunk $\frac{4}{8}$ inch.

CALAMARIA LONGICEPS. N. S. (See plate, Fig. 1.)

Strongly iridescent soot-coloured, a shade lighter beneath; the scuta and scutella edged with whitish. Eyes and tongue black.

Scuta 131, Scutella 26.

HABIT.—*Pinang*.

The head is elongated, narrow, conical, the muzzle rounded, projecting over the lower jaw. The anterior frontals are much smaller than the frontals, which on the sides occupy the place of the absent frenal shield, and thus reach the second upper labial; the nasal is very small, rectangular, perforated by the rather large nostril near the lower anterior angle. The eye is comparatively large, between an obliquely placed rectangular præ-orbital, and a similar post-orbital shield; the supra-orbitals are narrow, rectangular; the vertical moderate, pentagonal, arched and somewhat narrowed at the anterior margin. The occipitals, the largest, are elongated, bordered below by the large fifth upper labial, and behind by a single pair of post-occipitals. Each jaw has 5 pairs of labials. Of the 2 pairs of mentals, the anterior is the longer, and is enclosed by the rostral and 3 anterior labials, the posterior pair, by the fourth labial. The teeth are minute, sharp, reclining, all of equal size. The trunk is cylindrical, narrowed towards

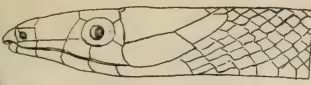


Fig. 1.

(Magnified)



Fig. 2.

(Magnified)



Fig. 3.

(Natural size)



Fig. 4.

(Natural size)

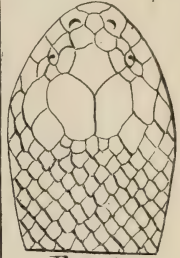


Fig. 5.

(Natural size)

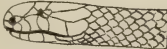


Fig. 6.

(Natural size)



Fig. 7.



(Natural size)



Fig. 8.

(Natural size)

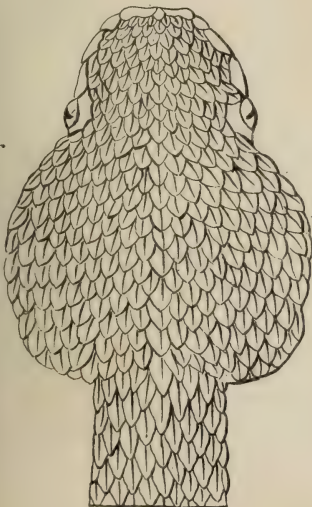
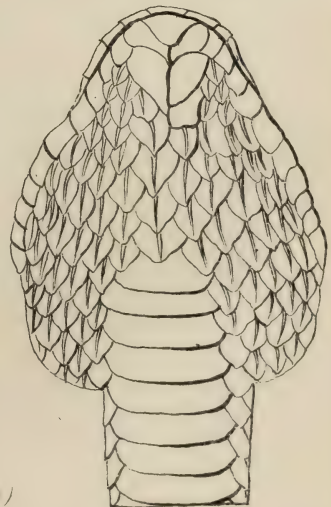


Fig. 9.

(Natural size)



both extremities, covered with 15 longitudinal series of smooth, rhombic, imbricate scales. The abdomen is arched, the short tail tapering to a blunt point. This species approaches to *Calamaria alba* (Linné), (*C. brachyorrhos*, Schlegel), but differs by its elongated shape of the shields of the head, and its larger eyes. A single individual, captured by W. T. Lewis, Esq., on the Great Hill of Pinang, was of the following dimensions :

Length of the head,	$0\frac{3}{8}$ inch.
Ditto ditto trunk,	5
Ditto ditto tail,	$0\frac{5}{8}$
	<hr/>
	$6\frac{1}{8}$ inch.

Circumference of the trunk $\frac{9}{16}$, of the neck $\frac{3}{8}$, at the root of the tail $\frac{3}{8}$ inch.

CALAMARIA SAGITTARIA.

SYN.—*Calamaria sagittaria*, Cantor : Spicil.

Head yellow or white, marbled with black, forming a streak above the citrine lips ; neck white with a black arrow-shaped mark ; back partly ash, partly rust-coloured, with a medial series of distant minute black spots ; sides bluish-black or grey, with a narrow black line above ; beneath citrine, the throat marbled with black, and with a minute black spot near the lateral angle of each scutum. Iris golden, tongue carmine.

Scuta 216 to 227 ; Scutella 57 to 70.

HABIT.—*Malayan Peninsula*.

Bengal, Assam.

But for the diminutive size, and the reduced shields of the head and throat, this species might be taken for a *Coronella*. The head is but little distinct, depressed, ovate, covered by the normal number of shields. The anterior frontals are very small, pentagonal ; the frenal short rectangular. The nostrils are rather large, piercing the middle of the nasal. The eyes are large, prominent with one præ-orbital, two post-orbitals ; the upper jaw, but slightly longer than the lower, has on each side 6 labials, the lower 7, enclosing two pairs of small mentals. The temples are covered by three shields. The trunk, with 17 longitudinal series of smooth, rhomboidal imbricate scales, is slightly thick-

er towards the middle than at the extremities; the back throughout depressed, forming an angle with the sides, and the abdomen is flat, which makes a vertical section of the body square. The tail is very slender, tapering to a sharp point, and exceeds one-fifth of the entire length. The teeth are very minute, of equal size. A single specimen from the Malayan Peninsula was of the following dimensions:

Length of the head,	0 $\frac{2}{8}$ inch.
Ditto ditto trunk,	9 $\frac{3}{8}$
Ditto ditto tail,	2 $\frac{2}{8}$
	<hr/> 11 $\frac{7}{8}$ inch.

Circumference of the trunk: $\frac{4}{8}$, of the neck and root of the tail $\frac{3}{8}$ in.

In Bengal this species is of no uncommon occurrence, particularly during the rainy season, when the water compels the serpents to leave the shady recesses which most of them occupy to avoid the heat of the day. The present species appears to be closely allied to the African *C. arctiventris*, Schlegel.

Of the preceding four species, the three first appear at Pinang exclusively to inhabit the hills, but the variety of *C. lumbricoidea* occurs at Singapore in valleys. They are nowhere to be met in numbers. They are of gentle peaceable habits, never attempting to bite, and scarcely to escape. They are sluggish, move but slowly, and to a short distance, even when compelled by danger, and soon resume the motionless position which they appear to affect. The remarkable abstinence of most of their congeners, they possess but in a very limited degree. In captivity they refuse food, and soon expire; besides, they are so delicate, that slight pressure in examining them, is sufficient to kill them. Their bodies are very smooth, and brilliantly reflect rain-bow-colours, which continue in preserved specimens, long after the gay livery has faded. They feed upon slugs, earth-worms, and insects. The stomach of a *C. sagittaria* contained remains of an *Iulus* and some sand. In general appearance, and habits these species of *Calamaria* strongly resemble the Malayan *Elaps* (vide infra.)

GEN. CORONELLA, *Laurenti*.

Head above covered with large plates, of which one between the eyes;

sides of the head and occiput with imbricate scales; trunk narrowed near the head, thicker towards the middle; tail conical, elongated, tapering to a sharp point.

CORONELLA BALIODEIRA, Schlegel.

SYN.—Patza Tutta, Russell I. Pl. 29?

Coluber pictus, Daudin?

Coluber plinii, Merrem?

Coronella baliodeira, Boie MS.

Above lighter or darker olive brown, yellowish on the head, the scales minutely dotted with dark brown; the anterior part of the trunk with a number of distant transversal ocellated lines, composed of single transversal series of white scales, edged with black, labial shields yellow edged with black; beneath pearl coloured or yellowish white; iris golden, lower half blackish; tongue black.

Scuta 122 to 132; Scutella 65 to 72.

HABIT.—*Pinang*.

Java.

Of two individuals from the hills of Pinang, the larger was of the following dimensions:

Length of the head, $0\frac{5}{8}$ inch.

Ditto ditto trunk, $8\frac{5}{8}$

Ditto ditto tail, $3\frac{6}{8}$

1ft. 1 inch.

Circumference of the neck $\frac{4}{8}$, of the trunk $\frac{7}{8}$, of the root of the tail $\frac{5}{8}$ inch.

Both agree with the description of M. Schlegel, except in having two small præ-orbitals instead of one. Russell's No. 29, from Casemcottah, which according to M. Schlegel is *Coluber pictus*, Daudin, *C. plinii*, Merrem, is probably intended to represent the present species. It is of fierce habits.

GEN. XENODON, H. Boie.

Head scarcely distinct, muzzle obtuse, nostrils rounded, between 3 shields; eyes encircled behind only by 3 shields; trunk short robust; tail rather, short slowly tapering; 4 very large mentals, the last upper maxillary tooth the longest.

XENODON PURPURASCENS, Schlegel.

SYN.—*Coronella albocincta*, Cantor, (Var.)

Above olive brown with black spots, and numerous pale red transverse zig-zag bands, each with a submarginal black line. The first occupies the space between the eyes, continuing obliquely backward over the cheeks and lips; the second, arrow-shaped, diverging over the neck; labial shields yellow with brown margins. Beneath strongly iridescent pale carmine; every other scutum entirely or partially black near the lateral angles. Iris circular, golden, lower half dotted with black; tongue black.

Scuta 179 to 183; Scutella 36 to 65.

HABIT.—*Pinang*.

Java, Tenasserim, (Var) Chirra-Punji, Assam, Darjeling, Midnapore (Bengal.)

A solitary individual observed on the summit of the Great Hill of Pinang, defended itself vigorously. The dimensions were:

Length of the head,	0 ft. 1 inch.
Ditto ditto trunk,	1 8 $\frac{3}{8}$
Ditto ditto tail,	0 3 $\frac{5}{8}$
	<hr/>
	2 ft. 1 inch.

Circumference of the neck, $1\frac{4}{8}$, of the trunk 2, of the root of the tail $1\frac{1}{8}$ inch. It differs from the description of M. Schlegel in having 21 longitudinal series of scales instead of 19, and on the right side 3 præ-orbitals. Labials on each side $\frac{8}{10}$. The Variety described as *Coronella albocincta* inhabits Assam, Chirra Punji, Darjeling, and Midnapore (Bengal.) It differs from those of the southern localities in having the head not distinct from the trunk, and its shields are shorter. The eyes are smaller, and, owing to the much swollen cheeks, appear sunk, which with the remarkably shelving profile, contribute to render the physiognomy singularly scowling. The largest specimen in the Museum of the Asiatic Society measures in length 2 feet $5\frac{3}{8}$ inch., of which the head $\frac{6}{8}$, the trunk 2 feet $1\frac{5}{8}$, and the tail 3 inch. In all, the livery is individually varying, but the arrow-shaped mark, double in some, appears to be constant. Labials on each side $\frac{7}{9}$.

GEN. LYCODON, *H. Boie.*

Head not very distinct, oblong, depressed; supra-orbital shield triangular, narrowed in front; præ-orbital one; post-orbitals two; frenal one; eyes sunk, far removed from the muzzle; pupil vertical; trunk elongated, somewhat compressed with smooth, rhomboidal, imbricate scales; tail short, tapering: anterior maxillary teeth longer than the rest.

LYCODON AULICUS, (Linné.)

LYN.—*Coluber aulicus*, Linné (not apud Daudin.)

Russell* I, Pl. 16, Gajoo Tutta.

Coluber striatus, Shaw?

Coluber malignus, Daudin.

Lycodon hebe, Boie, apud Wagler, Schlegel (*excl. Synon. Col. hebe, Daud.*)

Lighter or darker chestnut with numerous white transversal bands, (in some spotted with black,) on the sides forming a forked network, composed of brown scales edged with white; on each side of the hind-head a white triangular spot (confluent in some,) with brown spots; lips similarly coloured; beneath pearl-coloured; eyes black; tongue whitish.

Scuta 208 to 257; scutella 57 to 91.

HABIT.—*Pinang.*

Bengal, Coromandel.

VAR. A.

SYN.—*Lycodon hebe*, Var, Schlegel.

With a number of large square white spots, with black edges and central spots.

HABIT.—*Pinang.*

Bengal.

VAR. B.

SYN.—Russell II, Pl. 37.

Lycodon capucinus, Boie.

Lycodon hebe, Var. javan. Schlegel.

Lycodon atropurpureus, Cantor.

* Russell I, Pl. 26, Karetta, upon which is founded *Coluber galathea*, Daudin, appears to represent the present species, or one of its Varieties.

Chesnut or deep purple marbled with white veins, edged with black, with or without a white collar.

HABIT.—*Pinang, Malayan Peninsula.*

Tenasserim Provinces, Java.

VAR. C.

LYN.—*Lycodon hebe*, Var. *timorensis*, Schlegel.

Chestnut, with a white collar, and indistinct traces of white network.

HABIT.—*Pinang, Malayan Peninsula.*

Pulo Samao, Timor.

VAR. D.

SYN.—Russel II, Pl. 39.

Lydocon subfuscus, Cantor.

Uniformly light brown above, the lips white, edged with brown.

HABIT.—*Malayan Peninsula.*

Bengal.

This species occurs in the Malayan countries both in the hills and valleys, but it is apparently not so numerous as it is in Bengal. It is of fierce habits and defends itself vigorously, In one examined the stomach contained a young *Euprepis rufescens*, (Shaw).

The largest individual observed, *Var. B.*, was of the following dimensions :

Length of the head,	0 ft.	$0\frac{6}{8}$	inch.
Ditto ditto trunk,	1	$8\frac{7}{8}$	
Ditto ditto tail,	0	$4\frac{1}{8}$	
	<hr/>		
	2 ft.	$1\frac{6}{8}$	inch.

Circumference of the neck 1 inch, of the trunk $1\frac{4}{8}$, of the root of the tail $\frac{7}{8}$ inch.

Ophites.—Wagler differing from *Lycodon* in the absence of the præ-orbital shield ; frenal elongated ; eyes small, scales rhombic with truncated points ; some of the posterior dorsal scales keeled.

LYCODON PLATURINUS, (SHAW,)

SYN.—Seba Thes. I, 83, 3.

Russel, II, Pl. 41.

Coluber platurinus, Shaw.

Coluber platyrhinus, Merrem.

Lycodon subcinctus, H. Boie.

Ophites, Wagler.

Lycodon subcinctus, apud Schlegel.

Shining blackish brown with steel blue reflections, and a varying number of broad, distant bands, the lips, throat and a collar all white, spotted with black; beneath pale blackish brown, the anterior part of the abdomen, the sharp lateral angle and the broad posterior margins of the scuta and scutella whitish. Eyes black; tongue flesh-coloured.

Scutta 221, Scutella 74.

HABIT,—*Pinang*.

Java, Bengal.*

On both sides of each jaw the anterior 4 or 5 teeth increase in size and are longer than the rest. The fifth upper maxillary tooth is removed from the preceding, which in addition to the general shape of the head and the lax integuments, imparts to this serpent a striking resemblance to the venomous genus *Bungarus*. In fierceness it resembles the preceding species. The only individual observed was captured near the summit of the Great Hill of Pinang, where it had seized a large *Euprepis rufescens*, (Shaw). It was of the following dimensions.

Length of the head,	0 ft. 1 inch.
Ditto ditto trunk,	2 8 $\frac{4}{8}$
Ditto ditto tail,	0 7 $\frac{4}{8}$
	<hr/>
	3ft. 5 inch.

Circumference of the neck 1 $\frac{5}{8}$, of the trunk 2 $\frac{4}{8}$ inch.

LYCODON EFFRÆNIS, N. S.

Shining bluish black above, with a few minute white spots, not affecting the ground colour; the throat, lips, and a band, bordering the sides of the head from the muzzle to the hind head, buff coloured, finely marbled with black; beneath strongly iridescent, pale bluish black, the scuta with whitish edges; the body encircled by a number (11,) of broad distant buff rings, above with indentated margins. Eyes black, pupil elliptical; tongue whitish.

Scuta 228; Scutella 72.

* According to M. Schlegel, who observes that a specimen has been forwarded from Bengal by M. Duvaucel. No specimen exists in the Museum of the Asiatic Society, nor are the natives acquainted with the species.

HABIT.—*Pinang*.

The head is elongated, ovate depressed, broader than the neck, the muzzle rounded, slightly projecting; the anterior frontals are orbicular pentagonal, much smaller than the frontals, which are bent over the sides, substituting the absent frenal, so as to meet the second upper labial; the nasal is small, rectangular, obliquely wedged in between the rostral, the two pairs of frontals, and the anterior upper labial; the nostril large, piercing the middle of the shield; the vertical is elongated pentagonal, broader in front, so as to render the posterior part of the moderate supræorbitals broader than the anterior; the occipitals are the largest, elongated, on each side surrounded by 3 scales, somewhat longer than the rest covering the temples, and behind by two small post-occipitals. The eyes are proportionally large and prominent, surrounded by one præorbital and two smaller post-orbitals, the lower of which touches the narrow projecting fifth upper labial, which with the fourth, borders the lower part of the orbit; the jaws are covered by 8 pairs of upper, 9 of lower labials. The gape is moderate; the particulars of the dentition noted in *L. platurinus*, exist in the present species. The two anterior of the three pairs of small elongated mental shields are bordered by the six anterior pairs of labials; behind by a number of small scales. The trunk is slender, decreasing towards both extremities, with 17 longitudinal series of smooth, rhomboidal, slightly imbricate scales. The back is depressed, forming an angle with the compressed somewhat bulging sides. The latter are joined to the flat narrow abdomen under a right angle on the sides of the scuta, so that the vertical section of the body is quadangular. A single individual found by Sir Wm. Norris on the Great Hill of Pinang, was of the following dimensions:

Length of the head,	$0\frac{4}{8}$ inch.
Ditto ditto trunk,	$9\frac{6}{8}$
Ditto ditto tail,	$2\frac{2}{8}$
	<hr/>
	1 ft. $0\frac{4}{8}$ inch.

Circumference of the neck $\frac{4}{8}$, of the trunk $\frac{6}{8}$, of the root of the tail $\frac{2}{8}$ inch.

In fierceness the present species resembles its congeners, but unlike them, it raises vertically the anterior part of the body, and bites after

a few oscillating movements from side to side. *Lycodon platurinus*, and *aulicus*, like many other harmless,—and some venomous serpents, the pupils of which are vertically closed by the light, prepare to attack horizontally coiled on the ground, with the head bent close to the body, and drawn as far backwards as possible, when, suddenly uncoiling the anterior part of the body, they dart obliquely upwards, but as they are blinded, not always in the direction apparently aimed at, and they frequently miss the aim.

GEN. COLUBER, *Linné*

Abdomen with scuta ; scutella under the tail.

COLUBER FASCIOLATUS, Shaw.

SYN.—Russel I. Pl. 21 Nooni Paragoodoo.

Coluber hebe, Daudin (*Synon.* apud Boie, Wagler, Schlegel).

“Cineritious grey with an obscure cast of reddish brown, particularly about the head and neck. The back variegated by black and white, or black and yellowish, narrow bands ; and on the sides are two or three rows of short, separate oblique lines, formed by the yellow or white edges of the lateral scales ; but in general these bands are not visible on the tail. The scuta (192) and scutella (62) are of a dusky pearl-colour.” (*Russell I. Pg. 26.*)

HABIT.—*Malayan Peninsula.*

Coromandel Coast.

A young individual, killed in Province Wellesley corresponds to the description of Russell, copied by Shaw and Daudin. It has two small post-orbitals, one elongated præ-orbital, one minute irregularly hexagonal frenal, and on each side 8 upper, 9 lower labial shields. The trunk is covered by 21 longitudinal series of smooth imbricate scales, which are rhombic on the sides, rhomboidal above, all with rounded points. The teeth are of uniform size, and as Russell correctly describes them, very small, reflex, sharp, numerous. The dentition, therefore, sufficiently indicates that the species cannot be placed in the Gen. *Lycodon*, to which it has been referred by M. M. H. Boie, Wagler and Schlegel. The young one is of the following dimensions :

Length of the head,	0 $\frac{4}{8}$ inch.
Ditto ditto trunk,	8 $\frac{1}{8}$
Ditto ditto tail,	2 $\frac{1}{8}$

10 $\frac{6}{8}$ inch.

Greatest circumference of the trunk, $\frac{5}{8}$ inch.

Scuta 201 ; Scutella 73.

COLUBER RADIATUS, Schlegel.

SYN.—Russell II. Pl. 42.

Coluber quadrifasciatus, Cantor, (Var.)

Head and back light yellowish bay, paler on the sides ; the hind head with a transversal black line, branching off along the exterior margins of the occipitals ; a black oblique streak behind the eyes, and another beneath them dividing both jaws. On each side of the back a broad longitudinal black band, relieved at intervals by a short network, produced by 3 or 4 scales of each series being edged with pale brown, and the skin between them white. The bands, in some commencing at a distance from the head, are continued or interrupted, terminating on the posterior part of the back. Below them is on each side a parallel black line ; lips, throat and lower surface yellow. Iris bright gamboge with a concentric black ring. Tongue bluish black.

Young. Above of clearer colours ; beneath pearl-coloured.

Scuta 222 to 248 ; Scutella 82 to 94.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Java, Sumatra, Cochin China, Tenasserim, Assam.

This species is numerous in marshes, and paddy-fields, and often becomes a tenant of out-houses, where during the day it remains concealed, till nightfall favours its pursuit after rats. It is however equally diurnal, preying upon smaller birds, lizards and frogs. Assam produces a local variety distinguished by 18 instead of 17 longitudinal series of scales, of which the 3 upper ones are all lineated, whereas normally such is the case on those of the posterior part of the body. It makes a vigorous defence, and in darting at an enemy is capable of raising nearly the anterior two thirds of the body from the ground. In a female were found 23 whitish, soft, cylindrical eggs, of which the largest measured $1\frac{1}{8}$ inch. in length. The largest individual observed was of the following dimensions :

Length of the head,	0 ft.	$1\frac{4}{8}$ inch.
Ditto ditto trunk,	4	$3\frac{4}{8}$
Ditto ditto tail,	0	$10\frac{4}{8}$
	<hr/>	
	5 ft.	$3\frac{4}{8}$ inch.

Greatest circumference, $3\frac{6}{8}$ inch.

Habits and general appearance link the present species to *Col. dhumnades*, Cantor,* and *Col. mucosus*, Linné (*Col. blumenbachii*, Merrem,) but the latter as well as its variety with uniformly smooth scales (*Col. dhumna*, Cantor : Spicil.) utter when irritated a peculiar *diminuendo* sound, not unlike that produced by a gently struck tuning-fork.

COLUBER KORROS, Reinwardt.

SYN.—*Coluber korros*, Reinwardt, apud Wagler, Schlegel.

Brownish green above, the scales of the posterior part of the trunk and of the tail with black points and edges, producing a regular network; beneath yellowish white or pearl-coloured; the lateral part of the scuta light bluish-grey. Iris bright yellow with a bluish grey or blackish concentric ring, tongue black.

Young.—Above with some indistinct transversal bands, produced by two lateral white spots on some of the scales; the posterior part of the trunk with dark longitudinal lines.

Scuta 162 to 190; Scutella 79 to 136.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Java, Sumatra, Arracan, Tenasserim.

It is numerous in the Malayan vallies. The largest individual measured :

Length of the head,	0 ft.	1 $\frac{2}{8}$ inch.
Ditto ditto trunk,	2	6 $\frac{2}{8}$
Ditto ditto tail,	1	4 $\frac{2}{8}$
	<hr/>	
	3 ft.	11 $\frac{6}{8}$ inch.

Greatest circumference of the trunk 3 inches.

Its habits are similar to those of the last mentioned species, from which it is easily distinguished by its 15 longitudinal series of smooth rhomboidal scales with rounded points.

COLUBER HEXAHONOTUS, N. S.

Head and back dark brown, changing to pale brownish buff on the sides; trunk with numerous, close, transversal black bands, each with

* *Chusan*.—It is covered by 14 to 16 long it. series of rhomboidal scales, of which those of the two uppermost series commence at a short distance from the head, exhibiting the central raised line.

a few white spots on the lower parts, becoming indistinct towards the posterior extremity of the trunk, from whence the colour is uniformly dark brown; labial shields yellow, edged with black; beneath yellowish white, scutella edged with brown. Iris gamboge with a black concentric ring; pupil round, tongue black; central series of dorsal scales hexagonal.

Scuta 191; Scutella 148.

HABIT.—*Pinang*.

The head is distinct, elongated, with the muzzle broad, truncated, covered above with the normal number of shields, in form resembling those of *Col. korros*. The eyes are large, prominent, with two præ-orbitals, of which the superior is the larger, the inferior is wedged in between the 3rd, 4th and 5th upper labials. In addition to two post-orbitals, there is an elongated crescent-shaped infra-orbital, resting on the 6th and 7th upper labials. The latter are 8 on each side, of which the 5th, broad hexagonal, borders the orbit; the following are elongated, gradually increasing in size. The lower labials, 9 on each side, lie on the chin in contact with two pairs of elongated shields. The nostrils are rather large, orbicular, opening near the margin of the anterior frontals. The frenal is small, obliquely situated between the surrounding shields. The temples are covered by two pairs of elongated shields. The gape is wide, the teeth minute, of equal length. The trunk is slender, much compressed with 17 longitudinal series of smooth, rhombic, sub-imbricate scales, of which the central series is hexagonal. The abdomen narrow, arched. The tail is very slender elongated, tapering to a sharp point.

A solitary individual, discovered by Sir William Norris on the Great Hill of Pinang, was of the following dimensions:

Length of the head,	0 $\frac{5}{8}$ inch.
Ditto ditto trunk,	10
Ditto ditto tail,	4 $\frac{5}{8}$
	<hr/>
	1 ft. 3 $\frac{2}{8}$ inch.

Circumference of the neck $\frac{5}{8}$, of the trunk 1 inch., of the root of the tail $\frac{3}{8}$. In fierceness it resembled the preceding species.

ARBORIAL.

GEN. DIPSAS, *Laurenti*.

Head large, broad, depressed, cordate, covered with shields; neck narrow, trunk much narrower than the head, compressed, very long, beneath covered with scuta; tail cylindrical, imbricate.

DIPSAS DENDROPHILA, Reinwardt.

SYN.—Scheuchzer, 662, Fig. 11. (Col. variabilis, apud Merrem.)

Dipsas dendrophila, apud Wagler.

Dipsas dendrophila, Wagler, apud Horsfield: *Life of Raffles*.

Dipsas dendrophila, apud Schlegel.

Head, back and sides intense black with steel-blue, lilac, and green reflections; beneath pale black, iridescent; body and tail with numerous bright yellow transversal bands, widened below, sometimes joined on the back or abdomen, occasionally reduced to irregular spots; throat and lips bright yellow, labials with black edges. Pupil elliptical, vertical; iris and tongue black.

Scuta 218 to 225, Scutella 100 to 112.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Java, Celebes.

It inhabits the Malayan hills and valleys, but apparently in no great numbers. The largest individual measured:

Length of the head,	0 ft.	1 $\frac{4}{8}$ inch.
Ditto ditto trunk,	3	3 $\frac{7}{8}$
Ditto ditto tail,	1	0
	<hr/>	
	4 ft.	5 $\frac{3}{8}$ inch.

Greatest circumference of the trunk, 4 inch.

DIPSAS MULTIMACULATA, Schlegel.

SYN.—Scheuchzer, 657, Fig. 2.

Russell, II. Pl. 23.

Dipsas multimaculata, Schlegel

Ground-colour, above light greenish grey, minutely spotted and marbled with brown; on the head an angular, backwards diverging black mark with whitish edges; a black oblique line from behind the eyes to the hind head, where it joins a lozenge-shaped black spot with whitish edges; along the back and tail a series of large, irregularly oval, black spots with whitish edges, arranged in close quincunx series:

the sides with numerous, similarly coloured, oblique or arched, often interrupted, bands; labials greenish white, black-edged; beneath greenish white, tinged with rose-colour, minutely spotted with brown, and with a double or treble lateral series of irregular black spots. Iris pale greenish golden, minutely dotted with black; pupil elliptical, vertical; tongue whitish.

Scuta 202 to 235, Scutella 80 to 106.

HABIT.—*Pinang, Malayan Peninsula.*

Celebes, Java, Tenasserim, Bengal.

On the hills of Pinang this species appears to be more numerous than the former. The largest individual measured:

Length of the head,	0 ft.	0 $\frac{5}{8}$ inch.
Ditto ditto trunk,	1	10 $\frac{4}{8}$ "
Ditto ditto tail,	0	5 $\frac{6}{8}$
	<hr/>	
	2 ft.	4 $\frac{7}{8}$ inch.

Greatest circumference, 1 $\frac{2}{8}$ inch.

The central hexagonal scales are elongated, narrow on the anterior part of the trunk, which is covered by 19 longitudinal series of smooth, lanceolate, imbricate scales; from thence commence 17 series of broader scales.

DIPSAS CYNODON, Cuvier.

SYN.—*Dipsas cynodon*, apud Boie, Guerin, Schlegel.

Young. Ground-colour yellowish brown, head with a dark black-edged arrow-shaped mark, and a black oblique streak from the eye to the nape of the neck; labials pearl-coloured, edged with black; back with numerous black transversal marks, shaped like two letters *Y* placed horizontally towards each other or in quincunx, becoming indistinct towards the tail. Beneath pearl-coloured with a black spot near the lateral part of the scuta; scutella edged and minutely dotted with brown.

Scuta 225, Scutella 92.

Adult. Head and back uniformly greyish brown tinged with lilac, with a number of distant large, transversal, purple, bands (the scales edged with black), lozenge-shaped with triangular lateral appendages, becoming indistinct towards the tail, which is alternately brownish buff

and purple with black-edged scales. Beneath pale yellow, scutella minutely dotted and edged with brown. Iris pale golden, minutely dotted with purple; pupil elliptical vertical; tongue whitish.

Scuta 275, Scutella 158.

HABIT.—*Pinang, Malayan Peninsula.*

Java, Tenasserim.

A young one was captured on the Great Hill of Pinang by W. T. Lewis, Esq. An adult, killed in Province Wellesley, was of the following dimensions.

Length of the head,	0 ft.	1 $\frac{4}{8}$ inch.
Ditto ditto trunk,	4	0 $\frac{3}{8}$
Ditto ditto tail,	1	4
	<hr/>	
	5 ft.	5 $\frac{7}{8}$ inch.

Circumference of the neck, 1 $\frac{6}{8}$, of the trunk, 2 $\frac{4}{8}$ inch.

The young had 21, the adult 23 longitudinal series of smooth, lanceolate, imbricate scales. The long maxillary and palatal teeth are disproportionally less developed in the young than in the adult.

DIPSAS BOA, (H. Boie.) (See Plate, Fig 3.)

SYN.—*Amblycephalus boa*, H. Boie: Isis.

Dipsas boa, apud Schlegel.

Ground colour above: rose-coloured washed with brown, varying in intensity and shade from light bay to umber, prevailing so as to make the ground colour appear as minute spots, and with numerous irregular black spots, confluent on the head; cheeks and lips carnation, with a vertical black streak from the middle of the orbit. Beneath carnation, dotted with umber, sometimes assuming the shape of large irregular spots. Iris: silvery rose-coloured, lower half dotted with black, pupil elliptical, vertically contracted by the light; tongue whitish.

Scuta abdominalia 164, Scuta subcaudalia 112; or 170+109.

HABIT.—*Pinang.*

Java.

The head is depressed, elongated, conical, with the muzzle truncated; the rostral shield is very large, vertically placed; the cheeks compressed, but the lips very tumid below the eyes. Of the nine crown shields the occipitals are distinguished by their reduced size, and

frequent sub-division in 2 linear inter-occipitals, bordered by two large polygonal post-occipitals, enclosing a smaller third, linear. Behind the latter appears on each side a small hard tubercle, covered like the rest of the hind head with minute polygonal scales. Each temple is protected by 5 to 6 large shields, and as many smaller resting upon the labials. The nasal is large, pyramidal with the rounded nostril in the centre, and the apex wedged in between the 3 frenals, placed obliquely or vertically one above the other. The eye is large, prominent, encircled by the supra-orbital and 7 smaller shields, so that none of the upper labials reach the orbit. The lips are arched, and outwardly appear to reach to the hind head, but the commissure, or the angle of the mouth is situated immediately below the eye, which greatly reduces the opening of the mouth. Of the 9 pairs of upper labials the anterior 6 are narrow, but very deep and bulging; the posterior 3 are broader, elongated; the inferior labials, 11 pairs, are as well as the rostral, greatly reduced by the 3 pairs of very large mentals. The front view of the head grotesquely resembles that of a mastiff. All the teeth are strong, but the front tooth on each side of the lower jaw is longer than the rest; the palatal rows are very close together, and converging. The trunk is much compressed, covered by 13 longitudinal series of scales, of which the dorsal row is composed of very large hexagonal ones, each with a strong keel; the rest are smooth, rhombic, imbricate. The abdomen is very narrow, and the sides of the scuta are bent upwards. The tail is elongated, slender, tapering, and much less compressed than the trunk. Of two individuals from the hills of Pinang, the larger, a male, was of the following dimensions:

Length of the head,.....	0 ft.	1 inch.
Ditto ditto trunk,.....	1	11
Ditto ditto tail,.....	0	11 $\frac{1}{8}$
	<hr/>	
	2 ft.	11 $\frac{1}{8}$ inch.

Circumference of the neck 1 inch, of the trunk $1\frac{5}{8}$, of the root of the tail $\frac{7}{8}$ inch. In a female were observed 4 cylindrical, whitish eggs, each $\frac{6}{8}$ inch in length. The stomach contained a few remains of insects.

This species is closely allied to *Dipsas carinata*, Schlegel, (*Amblycephalus*, Kuhl; *Pareas*, Wagler,) in which also the dorsal series of

scales are keeled. M. Schlegel's short description and figure (Pl. XI, 29, 30) appear to have been taken from an immature specimen.

The preceding four species are very fierce, their mode of attack is that of *Lycodon aulicus*. Kuhl has observed vibrating movements in the tail of *Dipsas multimaculata*, which however are also exhibited by *Dipsas trigonata* (Schneider), (*Col. catenularies*, Daudin,)—*D. cynodon*, Cuvier, and among the venomous serpents, by *Vipera russelli*, (Shaw) and several Asiatic species of *Trigonocephalus*, when they are irritated and preparing to bite.

GEN. HERPETODRYAS, H. Boie.

Head trigonal, very long, depressed, smooth, rather sharp; trunk and tail very elongated; scales, particularly those of the tail, large; those of the back partially carinate; in other respects resembling *Coluber*.

HERPETODRYAS OXYCEPHALUS, (Reinwardt.)

SYN.—*Coluber oxycephalus*, Reinwardt.

Gonyosoma viride, Wagler.

Herpetodryas oxycephalus, apud Schlegel.

Head above shining dark-green with a blackish straight line from the nostrils to the angle of the mouth; lips and throat pale yellowish green; trunk sea-green changing to light yellowish green on the lower part of the sides, all the scales with black edges; the anterior half of the tail, separated from the trunk by a transversal orange band, ochre, gradually changing to greyish brown on the posterior half, all the scales edged with black. Abdominal scuta light yellowish green with pale yellow edges; subcaudal scutella grey with black margins. Eyes moderate, little prominent; iris pale sea-green with a narrow pale yellow inner ring and a transversal black band; pupil circular, black. Tongue ultramarine, divided in the middle by a black longitudinal line. The exposed part of the larynx black.

Scuta 268, Scutella 149.

HABIT.—*Pinang*.

Java, Celebes.

The shields of the head are elongated, most so the linear frenal. The teeth are numerous; in each row the anterior six or eight are

longer than the rest, which gradually decrease. The scales of the trunk, in 25 longitudinal series, are rhombic with rounded points, imbricate, and all smooth except those covering the spinous processes, which are faintly lineated.

Of two individuals from the hills of Pinang, the larger, taken by Sir William Norris, was of the following dimensions :

Length of the head,	0 ft.	1 $\frac{4}{8}$ inch.
Ditto ditto trunk,	3	4
Ditto ditto tail,	1	1
	<hr/>	
	4 ft.	6 $\frac{4}{8}$ inch.

Circumference of the neck 2, of the trunk 3, of the root of the tail 1 $\frac{4}{8}$ inch. The ferocious habits of this serpent have been accurately described by M. Reinwardt. It has in a remarkable degree the power of laterally compressing the neck and the anterior part of the body, when the greyish blue skin becomes visible between the separated scales. In such state of excitement it raises nearly the anterior third vertically from the ground, continues fixed during several seconds with vibrating tongue, and bites. It then throws itself down, to rise to a renewed attack. A similar mode of attack characterises the following species, viz : *Dryinus nasutus*, (Lacépède,) (Russell, I. Pl. 12 and 13,)—*D. prasinus*, (Reinwardt.) (*Dryiophis prasina* apud Schlegel,) *Leptophis pictus* (Gmelin), and *Leptophis caudalineatus*.

GEN. DRYINUS,* Merrem, 1820.

Upper jaw much longer than the lower ; muzzle attenuated, more or less acute at the apex, which in some species is mucronate and moveable.

DRYINUS PRASINUS, (Reinwardt.)

SYN.—Seba, II, Tab. LIII, Fig. 4.

Coluber nasutus,† Shaw, apud Russell, II, Pl. 24.

Dryinus nasutus, Bell, (not Merrem, 1820.)

* In II. Boie's Genera, published in *Isis*, 1827, *Dryophis*, (Dahlman,) is substituted for this genus. Wagler in 1830 separated some species under the denomination of *Trogops*, and M. Schlegel in his "Essay" has exclusively retained *Dryiophis*, although Prof. Thos. Bell already in 1825 had published his article on *Leptophina* (comprising *Dryinus*, Merrem, and *Leptophis*, Bell.)

† The specific name was previously applied by Lacépède in 1790 to the other Asiatic species.

Dryophis prasinus, Reinwardt.

Tragops, Wagler.

Dryinus nasutus, Bell, apud Horsfield: *Life of Raffles*.

Passerita, Gray.

Dryiphis prasina, apud Schlegel.

"Ular daun" of the Malays.

Leek-green above, with some irregular white and black oblique lines, paler on the cheeks and upper lips; tail cinnamon; under lips and throat white, scuta and scutella light green or mother-of-pearl, on each side with a white or pale yellow longitudinal line, below which in some a second, green, line. Pupil black, elongated-pyriform, with the apex turned forwards, horizontally contracted by the light. Iris pale burnished golden, bright on the pupillary margin, the upper half of which forms a little behind its middle a small pointed lobe. Tongue bluish white.

Scuta 186 to 228, Scutella 140 to 203.

HABIT.—*Malayan Peninsula and Islands*.

Celebes, Java, Cochin-China, Siam, Burmah, Tenasserim, Arracan, Bengal, Assam.

VAR. A.

SYN.—*Dryiophis xanthozonius*, Kuhl?

Head less elongated and the rostral shield unusually small; upper lips in some white; besides the yellow and green lateral line, a central green; scuta and scutella in some with brown edges.

HABIT.—*Same localities*.

VAR. B.

Head above light brownish grey, tinged with sky-blue and rose-colour cheeks and lips pale rose; trunk light brownish ash, changing to pale rust colour on the tail; whitish grey on the sides; beneath buff, with a white longitudinal line on each side. Iris burnished silver, tongue white.

HABIT.—*Pinang Hills*.

VAR. C.

Upper parts saffron yellow, paler on the sides; beneath sulphur-coloured, with a lateral white line. Pupil deep burnished golden; tongue white.

HABIT.—*Pinang Hills*.

This species is exceedingly numerous in the Malayan forests, both

in the hills and valleys, preying upon small birds, arboreal lizards, frogs, and in early age upon insects. It may readily be distinguished from *Dryinus nasutus*, (Lacép.) (Merrem, not Bell;—Russell, I. Pl. 12, 13) by two, sometimes 3 frenals on each side. The trunk is covered by 15 longitudinal series of smooth rhomboidal scales with rounded points, imbricate so as to appear linear; those of the tail are all broad rhombic. The anterior upper maxillary teeth gradually increase towards the sixth, which is the longest, and enclosed in a pointed fold of gingiva. The following teeth, commencing at a short interval, are short, but the last is very long with a furrow on the convex edge. The inferior maxillary teeth also increase in length towards the sixth, the longest, and are protected by a broad triangular scabbard, containing several additional loose teeth; the rest are uniformly small, commencing at a short interval from the sixth. The palatal are uniformly very short. The largest individual of a great number measured:

Length of the head,	0 ft.	2 inch.
Ditto ditto trunk,	4	$3\frac{5}{8}$
Ditto ditto tail,	2	$6\frac{4}{8}$
	<hr/>	
	7 ft.	$0\frac{1}{8}$ inch.

Circumference of the neck $1\frac{2}{3}$, of the trunk $2\frac{2}{8}$, of the root of the tail 1 inch.

The Varieties, of which *B.* and *C.* were from the hills of Pinang, are not numerous, and of a comparatively small size. The very young ones are as gentle as those of a more advanced age are ferocious. Their power of expanding the anterior part of the body and their mode of attack, have been noted under *Herpetodryas oxycephalus*.

GEN. LEPTOPHIS, *Bell*, 1825.

Rostrum obtuse, and the upper jaw projects but very slightly beyond the lower.

LEPTOPHIS PICTUS, (Gmelin.)

SYN.—*Coluber pictus*, Gmelin.

Coluber decorus, Shaw.

Russell, II. Pl. 26, *Cumberi* muken.

Bungarus filum, Oppel.

Dipsas schokari, Kuhl, (not Forsk.)

Dendrophis chairecacos, H. Boie.

Dendrophis, Wagler.

Dendrophis picta, Schlegel.

Head and body above bronze with strong golden reflections; skin between the scales of the anterior part of the body alternately ultramarine and black. Lips, throat, the two lowest lateral rows of scales, and the abdominal surface silvery mother-of-pearl. From the muzzle to the root of the tail a black line, bordering above the silvery sides, which below are circumscribed by a second black line, commencing a little behind the head. Iris bright golden with a transversal black line; pupil black, circular; tongue scarlet.

Scuta 167 to 187, Scutella 109 to 149.

HABIT.—*Malayan Peninsula and Islands.*

Manilla, New Ireland, Waigiou, Amboina, New Guinea, Pulo Samao, Java, Sumatra, Cochin-China, Tenasserim, Burmah, Bengal, Assam, Coromandel.

VAR. A.*

SYN.—*Coluber filiformis*, Linné, (young.)
Fil, Double Raie, Lacépède, (young.)
 Russell, II. Pl. 25, Mancas, Rooka, Maniar.
Coluber bilineatus, Shaw.
Leptophis mancas, Bell.
Dendrophis maniar, Boie.
Alcetula bellii, Gray, Ill. Ind. Zool.
Dendrophis lateralis, Gray: Ill. Ind. Zool.
Chrysopelea boii, Smith.
Dendrophis picta, Var. Schlegel.
Dendrophis boii, apud Cantor.

Above dull brownish black, with a light brown dorsal line; the two lowest series of scales pale greenish white, forming a lateral band, bordered above by a black line, commencing from the muzzle, more or less distinct, in some irregularly broken up on the anterior part of the body. A second faint black line below. Iris golden, in some dotted with black; tongue black.

HABIT.—*Malayan Peninsula.*

Bengal, Assam, Ceylon.

The species occurs numerously in the Malayan hills and valleys, but the contrary appears to be the case with the plain Variety, which in Bengal is equally common. The following must be added to the description of M. Schlegel. The frenal shield is small, rectangular;

* The Variety, *Col. polychrous*, Reinwardt, appears to inhabit neither the Malayan Peninsula nor Bengal.

superior labials 9, inferior 10 or 11; one præ-orbital, two, in some three small post-orbitals. The trunk is covered by 15 longitudinal series of smooth, imbricate scales; the central dorsal series is wedge-shaped, in some almost hexagonal, the next six are linear, but the lowest, as well as all the scales of the tail, are broad rhombic with rounded points. In a female were found seven coriaceous, whitish eggs of an elongated cylindrical shape, each $1\frac{3}{8}$ inch in length. In habits and mode of attack this species resembles *Dryinus prasinus*, but it is not exclusively arborial. Probably no instance affords a more striking difference in colours, between species and variety than the present: the former with dazzling brilliant livery; the latter in its plain, dull colours. Both attain to similar size: the largest male examined was of the following dimensions:

Length of the head,	0 ft.	$1\frac{1}{8}$ inch.
Ditto ditto trunk,	2	6
Ditto ditto tail,	1	1
		<hr/>
		3 ft. $8\frac{1}{8}$ inch.

Circumference of the neck, $1\frac{2}{3}$, of the trunk, 2, of the root of the tail, 1 inch. This serpent appears to possess uncommonly acute hearing, and turns its head in the direction of the sound.

LEPTOPHIS CAUDALINEATUS, N. S.

SYN.—*Ahætula caudolineata*, Gray: Illust, Ind. Zool.
Dendrophis ornata, Var, Schlegel.

Head, trunk, and tail above light brownish bronze, the scales with black edges; on the posterior half of the trunk four parallel black lines, terminating at the root of the tail, from whence commences a single central black line; sides metallic mother-of-pearl, from a short distance behind the head bordered by two parallel black lines of which the lower, the broader, covers the lower half of the last series of scales and the lateral part of the scuta; both the lines continue to the apex of the tail. Lips, throat and abdominal surface pale metallic citrine; the tail beneath with a black central line. Iris golden, dotted with brown; pupil round; tongue bluish white, the forked part black.

Young. Upper parts of the body Indian red, with metallic reflections.

Scuta 183 to 188, Scutella 105 to 110.

HABIT.—*Pinang, Singapore.*

The head large, less depressed than in the preceding species, the muzzle broad, blunt; cheeks tumid; all the shields of the crown are short and broad, except the vertical which is laterally arched, and very narrow behind. There is a single elongated post-occipital, and the rest of the hind head is covered with broad hexagonal shields. Each temple is covered by two pairs of large shields, in front of which a pair of very minute ones, bordering upon the equally small post-orbitals. The eye is large, prominent; the præ-orbital and the linear frenal proportionally small; the nostrils large, opening in the middle of the nasal; the rostral broad, slightly arched beneath. The labials, 9 on each side of both jaws, resemble those of the preceding species. The mouth is large; the maxillary teeth strong, distant. In the lower jaw the anterior ones gradually increase in length till the fourth, which appears like a canine, the rest as well as the palatal teeth are all smaller, of uniform length. The chin is covered by the second pair of labials and two pairs of mentals, of which the posterior pair is elongated. The trunk is strong, less compressed than in the preceding species, with 13 series of smooth imbricate scales, of which the two lowest series are large rhombic with rounded points, the next four elongated rhomboidal (linear), and the odd central dorsal rhomboidal, not larger than the rest. The tail is covered with broad hexagonal, not imbricate, scales. The abdomen is narrow, flattened; the centre part of the scuta with strongly arched margins; the sides turned upwards and forming a continued sharp lateral ridge. The tail is slender, tapering; its vertical section nearly square.

Of this species but two individuals were observed: a young one at Singapore, an adult on the Great Hill of Pinang. The latter measured:

Length of the head,	0 ft.	1 $\frac{2}{8}$ inch.
Ditto ditto trunk,	3	5 $\frac{6}{8}$
Ditto ditto tail,	1	2
	<hr/>	
	4 ft.	9 inch.

Circumference of the neck, 2, of the trunk 3 $\frac{6}{8}$, of the root of the tail, 1 $\frac{1}{8}$ inch.

In its mixed arborial and terrestrial habits and in fierceness it re-

sembles *L. pictus*, but its power of compressing and expanding the forepart of the body is somewhat limited.

This species appears somewhat to approach to *Leptophis formosus*, (*Dendrophis formosa*, Schlegel,) but besides other distinguishing characters, it differs from that, and all other Asiatic species in having but 13 series of scales. The indifferent figure of *Ahaetula caudolineata* in *Illustrations of Indian Zoology*, which appears to be all which has been published concerning this species, has led M. Schlegel to suppose it was intended to represent a Variety of *Leptophis pictus*, although the black outline of the head is correct.

LEPTOPHIS ORNATUS, (Shaw.)

SYN.—Scheuchzer, T. 606.

Seba, I. T. 94, Fig. 7.—II. T. 7, Fig. 1; T. 61, Fig. 2.

Russell, II. Pl. 2, Kalla Jin.

Coluber ornatus, Shaw.

Coluber ibiboboca, Daudin.

Coluber ornatus, Merrem, apud Horsfield : Life of Raffles.

Chrysopelea paradisi, H. Boie.

Dendrophis ornata, Schlegel.

HABIT.—Bengal, Ceylon.

VAR.

SYN.—Ular Chindi, Raffles.

Dendrophis chrysochloros, Reinwardt, (young.)

Head above intense velvety black, with three or four distant transversal bands, and numerous irregular spots of gamboge or sulphur colour; all the scales with an oval gamboge spot; from the hind head to the point of the tail a number of large rounded vermilion spots; lips, throat and abdominal surface greenish-gamboge, scuta and scutella with black margins. Iris and tongue black.

Scuta 198 to 236. Scutella 113 to 147.

Young. Head, trunk and tail above greenish olive, with a series of transversal black bands in pairs; the intervals between the bands vermilion; the sides with numerous distant, irregular, small black spots; lateral part of the scuta and scutella white, the ridge and the anterior margin black; the centre part pale greenish yellow; scutella partially edged with black, and with a central light blue line. Tongue vermilion, the forked part black.

HABIT.—Pinang, Malayan Peninsula.

Java, Sumatra, Tenasserim, Arracan.

The Variety, in which the black colour prevails, appears to be confined to the more southern countries, while that with yellow ground colour preponderating, the one described and figured by Russell, occurs in Bengal. The latter has the tongue alternately vermilion and black. Individuals without the frenal shield are not uncommon, and such was the one described by H. Boie as a distinct species (*Chrysopela paradisi*.) It inhabits the Malayan hills and valleys, but is there apparently less numerous than in Bengal. The largest male observed was of the following dimensions :

Length of the head,	0 ft. $1\frac{1}{8}$ inch.
Ditto ditto trunk,	2 $7\frac{6}{8}$
Ditto ditto tail,	0 $11\frac{4}{8}$
	<hr/>
	3 ft. $8\frac{3}{8}$ inch.

Circumference of the neck, $1\frac{1}{8}$, of the trunk, $1\frac{7}{8}$, of the root of the tail, $\frac{7}{8}$ inch.

The trunk is covered by 17 longitudinal series of smooth, imbricate rhomboidal scales, with rounded points. It is but seldom seen in trees ; it is more frequently found on the ground in the grass, watching for its prey : lizards (*Geckonidæ*,*) and frogs. The female has 6 to 8 white, elongated cylindrical eggs, about $1\frac{2}{8}$ inch in length. It differs from the other species in its being deprived of the power of compressing, and expanding the anterior part of the body, and in its gentleness. The young ones never attempt to bite, the adult but seldom, and without raising vertically the anterior part of the body. In the latter the four anterior teeth of the lower jaw are a little longer than the rest, which are uniformly small.

AQUATIC.

GEN. TROPIDONOTUS, *Kuhl.*

Head oblong ovate, rather indistinct, depressed ; nostrils between the sutures of two shields ; eyes moderate, with circular pupil, scales of the back lanceolate ovate, keeled, imbricate ; trunk elongated, cylindrical, tail moderately long, tapering.

* Vide *Ptychozoon homalocephalum*, supra.

TROPIDONOTUS UMBRATUS, (Daudin,) VAR.

SYN.—*Tropidonotus trianguligerus*, Schlegel.

Above shining brownish, or yellowish green olive; lips gamboge with a black oblique line between the sixth and seventh labials, a second from the orbit to the angle of the mouth; a third from the under lip to the upper part of the neck; trunk and tail with numerous black spots, in some very minute, irregular, in others larger, approaching to quincunx order; the sides with numbers of large square or triangular scarlet spots, separated from each other by broader or narrower black vertical bands. Scuta and Scutella gamboge with black margins, the latter with a black central line. Iris black with a narrow golden circle; tongue black.

Scuta 121 to 130, Scutella 76 to 84.

HABIT.—*Malayan Peninsula and Islands.*

Java, Bengal.

The vertical and supra-orbital shields are of an elongated narrow form; the anterior frontals triangular, longer than broad; the nostrils small, placed high on the sides, the frenal is elongated pentagonal, with the largest margin touching the præ-orbital. Of the three post-orbitals the lowest is the longest, wedged in between the fifth, sixth, and seventh upper labials, of which the fifth is the only one which reaches the orbit; the eye is moderate, prominent; the upper labials are 9, the lower 11 on each side. The mouth is very large, the teeth small, crowded, except the two last of the upper jaw, which are longer than the rest. The trunk is slightly compressed, covered by 19 longitudinal series of scales, of which the two lowest are broad rhombic, the rest elongated rhomboidal with rounded points, those of the back lineated. The abdomen is broad arched. This Variety differs in nothing but colours from *Tropidonotus umbratus*,* (Daudin), and to judge by the description of M. Schlegel, it appears to be identical with *T. trianguligerus*. In the Malayan valleys the Variety is very numerous; in Bengal it is less so, but there the species abounds in and near fresh water, where it preys upon fishes and frogs. The Variety attains to a

* Syn. Russell, II. Pl. 3. Dooblee, young.—Pl. 5. Dora, adult.—*Col. umbratus*, Daudin.—*Col. dora*, Daud.—*Col. brunneus*, Herrman.—*Col. atratus*, Herrm.—*Col. lugubris*, Merrem.—*Tropidonotus umbratus*, Schlegel.—*Tropidonotus dora*, apud Cantor.

size similar to that of the species, both of which are equally fierce. The largest individual was of the following dimensions :

Length of the head,	0 ft.	$1\frac{2}{8}$ inch.
Ditto ditto trunk,	1	$9\frac{5}{8}$
Ditto ditto tail,	0	$9\frac{3}{8}$
	<hr/>	
	2 ft.	$8\frac{2}{8}$ inch.

Circumference of the neck, 2, of the trunk, $2\frac{5}{8}$, of the root of the tail, $1\frac{5}{8}$ inch.

TROPIDONOTUS STOLATUS, (Linné.)

SYN.—Seba, II, Tab. 9, Fig. 1, 2.

Coluber stolatus, Linné.

Le Chayque, Daubenton, Lacépède.

Russell, I, Pl. 10, 11, 19.

La vipère chayque, Latreille.

Coluber stolatus, Lin., apud Shaw, Daudin.

Coluber tæniolatus, Daudin.

Natrix stolatus, Merrem.

Tropidonotus stolatus, Gray, Schlegel.

Head shining brownish olive with several black spots in the sutures of the shields : lips gamboge with several black oblique streaks ; head and trunk brownish olive with numerous distant black transversal bands, becoming indistinct towards the tail, and intersected by two parallel bands of a pale ochre or buff, the scales of which on the anterior part of the body edged with black. Beneath gamboge or mother-of-pearl ; in some the scuta with a small lateral black spot, or edged with black. Iris black with a narrow golden ring ; tongue black.

Scuta 143 to 156, Scutella 69 to 79.

HABIT.—Pinang, Malayan Peninsula.

Philippines, Tenasserim, Bengal, Assam, Nipal, Coromandel, Ceylon, Bombay.

This species, so exceedingly numerous in Bengal, is but rarely seen in the Malayan valleys. It is of very gentle habits, and feeds upon young frogs and toads. The largest male observed was of the following dimensions :

Length of the head,	0 ft.	$0\frac{7}{8}$ inch.
Ditto ditto trunk,	1	$4\frac{2}{8}$
Ditto ditto tail,	0	$5\frac{1}{8}$
	<hr/>	
	1 ft.	$10\frac{2}{8}$ inch.

Circumference of the neck, $\frac{7}{8}$, of the trunk, $1\frac{3}{8}$, of the root of the tail, $\frac{6}{8}$ inch.

The female has 6 small cylindrical white eggs, each about half an inch in length.

TROPIDONOTUS SCHISTOSUS, (Dandin.)

SYN.—Russell II. Pl. 4. Chittee.

Coluber schistosus, Daudin.

Tropidonotus schistosus, Schlegel.

Tropidonotus moestus, Cantor.

Above blackish olive, some with an indistinct blackish line from behind the eye along the side; the lips, the two lowest series of scales on each side, and the abdominal surface whitish yellow. Iris black with a narrow golden ring; tongue small, flesh coloured.

Scuta 138, Scutella 77.

VAR.

SYN.—*Tropidonotus surgens*, Cantor.

Above bright greenish olive, with a black serrated lateral line.

Scuta 148, Scutella 23.

HABIT.—*Malayan Peninsula*.

Philippines, Tenassarim, Bengal, Madagascar.

The shields of the head are short; there is but a single anterior frontal, of a triangular shape, truncated in front; the frontals are small pentagonal; the nasals nearly equal to the latter; the small semicircular nostrils almost vertical and appearing linear as they are provided with a valvule as in *Homalopsis*; from the lower part of the nostril a minute arched groove descends to the inferior margin of the shield; the frenal is small; the præ-orbital in length nearly equals the three postorbitals. The scales of the trunk are disposed in 17 longitudinal series, of which the two lowest on each side are hexagonal, each scale with a minute round protuberance near the apex; the scales of the next two series present a raised line terminating in a protuberance, but the remaining scales are elongated rhomboidal with truncated, slightly notched points, keeled, imbricate. These marks become indistinct when the integuments are about to be changed, which probably caused them to escape the notice of Russell. This species is not numerous in Bengal, and apparently less so on the Malayan Peninsula. The largest individual measured,

Length of the head,	0 ft.	1 inch.
Ditto ditto trunk,	2	$0\frac{4}{8}$
Ditto ditto tail,	0	$2\frac{4}{8}$
	<hr/>	
	2 ft.	4 inch.

Circumference of the neck : $1\frac{6}{8}$, of the trunk : $2\frac{4}{8}$, of the tail $1\frac{5}{8}$ in.

The length of the tail is very variable : in some it is contained $3\frac{1}{2}$, in other 6 times in the entire length. This species is very fierce, and prepares to attack by raising the head 3 or 4 inches vertically from the ground, and it has the power of flattening and laterally expanding the skin of the anterior part of the body, like *Naja*, but in a much slighter degree. It bites uttering a faint hissing sound. Frogs and fishes form its food.

TROPIDONOTUS CERASOGASTER.

SYN.—*Psammophis cerasogaster*, Cantor.

Above yellowish brown with pale golden reflections ; lighter on the sides, the scales of which in some partially edged with yellow ; cheeks, lips, throat and abdominal surface cherry-coloured, with a bright yellow lateral line from the muzzle to the point of the tail. Iris and tongue cherry-coloured.

Scuta 144 to 149, Scutella 60 to 69.

HABIT.—*Malayan Peninsula*.

Bengal, Assam.

The head is elongated, depressed ; sides angular, compressed ; muzzle truncated ; rostral broad, hexagonal, nearly vertical, arched below ; the anterior frontals the smallest, next to them the frontals ; the rest of the crown-shields are narrow, elongated ; each occipital bordered by two pairs of elongated temporals, below which three smaller. Nasals rectangular, placed at a right angle with the anterior frontals ; nostrils moderate, lateral ; the frenal smaller than the nasal ; præ-orbital longer than either ; the eye moderate, prominent. Besides three post-orbitals, there is a minute infra-orbital wedged in between the fifth and sixth upper labials, of which but a small portion of the sixth touches the orbit below. The lips are straight, turned up near their commissure, covered with 8 or 9 pair of upper, 10 lower shields. The mouth is large ; the teeth small, crowded, of equal length. The trunk is cylindrical, compressed, covered with 19 longitudinal series of imbricate, elon-

gated rhomboidal scales with rounded, slightly notched points, keeled except the two lowest series on each side, which are larger than the rest, rhombic, smooth. The abdomen is broad, arched; the tail robust at the root, cylindrical, tapering to a sharp point. A solitary individual from Province Wellesley was of the following dimensions:

Length of the head,	0 ft. 0 $\frac{7}{8}$ inch.
Ditto ditto trunk,	1 5 $\frac{7}{8}$
Ditto ditto tail,	0 6 $\frac{1}{8}$
	<hr/>
	2 ft. 0 $\frac{7}{8}$ inch.

Circumference of the neck, $\frac{7}{8}$, of the trunk, $1\frac{4}{8}$, of the root of the tail, $\frac{7}{8}$ inch.

In Bengal this species is not numerous. It is very fierce, attacks in a vertical attitude, but without expanding the anterior part of the body. Its food is that of the preceding. The elongated angular head makes this species resemble a *Psammophis*.

TROPIDONOTUS JUNCEUS, N. S.

Head above shining light brown, lips and throat gamboge; from the angle of the mouth an oblique gamboge band, both joining under a sharp angle on the neck; trunk and tail dull greyish olive, with a series of distant rounded whitish spots on each side; each scutum and scutellum with a small black spot on the sides, which as well as their anterior margins are minutely dotted with brown. Iris black with a golden ring; tongue small, greyish.

Scuta 157, Scutella 88.

HABIT.—*Pinang*.

The head is elongated ovate, with the sides angular, compressed; the muzzle truncated; the rostral shield moderate, square, deeply arched beneath, vertically fixed; the anterior frontals small, tetragonal; the frontals larger, angularly bent over the side, where they border the small square frenal; the other crown shields are rather small, the occipitals on each side bordered by small elongated shields, like the rest of the temples; the eyes large, prominent; præ-orbital one; post-orbitals three; nasal rectangular; nostrils lateral, large, rounded; upper labials 9, of which the fourth, fifth and sixth border the orbit; lower labials 11; mentals two pairs, elongated. The lips are slightly arched, the mouth wide; the teeth small, crowded; the last upper

maxillary tooth longer than the rest. The trunk is very slender, cylindrical, with the centre of the back raised, forming a sharp ridge, the sides bulging near the abdomen, which is arched. The scales are imbricate, very elongated rhomboidal with the apex notched, except the two lowest series on each side, which are broad rhombic; they are all sharply keeled, and disposed on the anterior part of the trunk in 19, on the middle part in 17 longitudinal series. The tail elongated, cylindrical, very slender, tapering to a fine point. A single individual observed on the Great Hill of Pinang by W. T. Lewis, Esq. was of the following dimensions:

Length of the head,	0 ft.	$0\frac{6}{8}$ inch.
Ditto ditto trunk,	1	7
Ditto ditto tail,	0	$7\frac{3}{8}$
	<hr/>	
	2 ft.	$3\frac{1}{8}$ inch.

Circumference of the neck, $\frac{7}{8}$, of the trunk, $1\frac{1}{8}$, of the root of the tail, $\frac{7}{8}$ inch.

Like most of the Asiatic species of this genus, the present is of fierce habits. It twice unprovokedly bit a wood cutter who happened to pass it. The bite, of course, was productive of no consequences except a slight momentary pain. The very slender make and the elongated tail are characters which approach this species to the arboreal *Colubridæ*.

GEN. HOMALOPSIS, *apud* Schlegel.

(*Erpeton*, Lacépède, 1803.—*Rhinopirus*, Merrem, 1820.—*Pseuderyx*, Fitzinger, 1826.—*Homalopsis*, Kuhl, 1827.—*Cerberus*, Cuvier, 1829.—*Hypsirhina*, Wagler, 1830.—*Hydrops*, Wagler, 1830.—*Helicops*, Wagler, 1830.—*Potamophis*, Cantor, 1836.)

Homalopsis, Kuhl. Nostrils opening vertically in the centre of the small nasals, with a valvule; crown shields small; dorsal scales imbricate, keeled; chin with many small shields, throat scaly; labials narrow; abdomen with scuta; tail short, tapering to a sharp point; beneath with scutella.

HOMALOPSIS RHINCHOPS, (Schneider.)

SYN.—Seba, II. T. 15. F. 3.

Hydrus rhinchops, Schneider.

Russell, I. Pl. 17. Karoo Bokadam.

Russell, II. Pl. 40, (young.)

Boa moluroides, Schneider.

Elaps boæformis, Schneider.
 Enhydrus rhynchops, Latreille.
 Hydrus cinereus, Shaw.
 Hurria schneideriana, Daudin.
 Coluber schneiderianus, Daudin.
 Coluber cerberus, Daudin.
 Python rhynchops, Merrem.
 Python elapiformis, Merrem.
 Python molurus, Merrem.
 Coluber obtusatus, Reinwardt.
 Cerberus (*Homalopsis obtusatus*), Cuvier.
Homalopsis schneiderii, Sehlegel.
 Cerberus cinereus, Cantor.

Young. Ash-coloured above, the head with black irregular spots and a short black line behind the eyes; trunk and tail with numerous distant black transversal bands; lips and throat white, dotted with black; the three or four lowest series of lateral scales white; beneath white with a black undulating band, frequently interrupted.

Adult.—Ash, lead-coloured or blackish grey with the black marks indistinct or invisible. Iris black; pupil elliptical, vertically contracted by the light; tongue very small, pale greyish.

Scuta 143 to 156, Scutella 49 to 72.

HABIT.—*Malayan Peninsula and Islands.*

New Guinea, Amboina, Timor, Sarapua, Java, Sumatra, Tenasserim, Bengal, Coromandel.

The shields of the upper part of the head, which appear to be of a constant form, are the nasals, the frontals, which enclose the small pair of triangular anterior frontals, (sometimes soldered together,) and the supra-orbitals. The rest are broken up in small, irregular, smooth pieces, differing in outline in each individual. The small eye, placed in a partly vertical, partly lateral position, is surrounded by a præ-orbital a post-orbital and two or three infra-orbitals. The frenal is comparatively, large, irregularly tetragonal. The anterior seven upper labials are narrow, very high; the posterior five or six each divided in two. A similar arrangement is observed in the inferior 13 or 14 of which the posterior 6 or 7 are very small. On the chin there is a pair of elongated shields immediately behind the 2 pair of labials. The posterior upper maxillary tooth is longer than the rest, and furrowed. The three anterior teeth in the lower jaw are longer than the rest. The trunk is covered with imbricate, finely lineated and keeled scales, of a rhom-

boidal form with rounded points, disposed on the anterior part in 25, on the posterior part in 17, longitudinal series. The tail is robust, tapering, and prehensile. In the Malayan countries this species occurs in numbers in rivers, estuaries, and occasionally along the sea coasts. It feeds upon fishes. Single individuals measuring between 3 and 4 feet in length, are of very rare occurrence. Of a great number the largest was of the following dimensions :

Length of the head,	0 ft.	$1\frac{2}{8}$ inch.
Ditto ditto trunk,	2	3
Ditto ditto tail,	0	7
		<hr/>
		2 ft. $11\frac{2}{8}$ inch.

Circumference of the neck, $1\frac{7}{8}$, of the trunk, $3\frac{3}{8}$, of the root of the tail, $1\frac{6}{8}$ inch. It is of peaceful habits ; the female brings forth 8 living young, each of which measures from 7 to $7\frac{1}{2}$ inches in length.

HOMALOPSIS BUCCATA, (Linné.)

SYN.—Scheuchzer, Pl. 660, Fig. 1, (young.)

Seba, II. Tab. 12. F. 1 ;—T. 13, F. 1 ;—T. 21, F. 3, (young.)

Coluber buccatus, Linné,

Coluber monilis, Linné.

Coluber subalbidus, Boddaert, apud Gmelin.

Le Demicollier, Lacépède.

Vipernkopfige Natter, Merrem.

Coluber buccatus, apud Shaw.

Russell, II, Pl. 33, (young.)

Coluber viperinus, Shaw.

Coluber buccatus, Daudin.

Coluber horridus, Daudin.

Echidna semifasciata, Merrem.

Homalopsis buccata, Schlegel.

Young. Ground colour, white or buff, becoming brownish on the crown shields, hindhead and lips ; on the muzzle an angular mark, with the apex between the frontals, Van Dyke brown or chestnut ; an oblique streak proceeds from the eye over the cheek, joining a broad cervical band, which, sending a narrow straight line to the occipitals, gives the upper part of the head a heart-shaped outline ; the back and tail with numerous broad transversal brown bands, between which the ground colour appears in the shape of white, often interrupted, narrower bands, and of a white spot in the centre and on each side of the brown bands. The latter reach but as far as the lowest four or five series of scales on the sides, which as well as the throat and abdomen are white ; on each

side of every third or fourth scutum a brown spot ; scutella black, or white, closely spotted with black.

Adult. The livery of the young indistinct : the ground colour of the upper parts pale greyish brown or olive ; the bands of a darker shade of the same colour, edged with black ; sides and beneath impure buff, the brown marks pale. Pupil black, elliptical, vertically closed by the light ; tongue small whitish.

Scuta 155 to 167, Scutella 73 to 89.

HABIT.—*Pinang, Malayan Peninsula.*

Java.

From the small, nearly vertically opening nostrils, proceeds a furrow downwards to the lower margin of the nasal. The anterior frontal is either entire and of a large rhombic shape, or consisting of two triangular shields ; the frenal is elongated, rectangular, the small eye is situated more laterally than in the preceding species, and surrounded by two post-orbitals, one præ-orbital, and two infra-orbitals. The seven anterior upper labials are very high, the posterior five are double ; of sixteen or seventeen lower labials, the nine anterior are the highest. The last tooth in the upper jaw is furrowed, and as well as the 3 or 4 anterior palatal and inferior maxillary teeth, longer than the rest. The folds of gingiva enveloping the teeth are very ample, and contain in addition to the fixed, numerous, 5 to 6 deep, accessory teeth. The chin is covered by four pairs of elongated scales, decreasing in length from the centre towards the labials. The scales of the trunk are rhombic, imbricate, slightly keeled and finely lineated, disposed on the anterior part in 39, on the posterior in 25 longitudinal series. The tail is robust, tapering and somewhat prehensile. The largest individual observed was of the following dimensions :

Length of the head,	0 ft. 1 $\frac{1}{8}$ inch.
Ditto ditto trunk,	1 11
Ditto ditto tail,	0 7
	<hr/>
	2 ft. 7 $\frac{1}{8}$ inch.

Circumference of the neck, 2, of the trunk, 3 $\frac{3}{8}$, of the root of the tail, 1 $\frac{6}{8}$ inch.

In the valleys of Pinang and on the opposite continent, this species is numerous in streamlets, tanks and in the irrigated fields,

where it feeds on fishes. The young ones are very gentle, and the old but seldom bite. In their movements they are sluggish, and on dry land very awkward. The female brings forth six or eight living young at the time, each between 7 and 8 inches in length.

Hypsirhina, Wagler. Resembling *Homalopsis* in the form and situation of the nostrils, the integuments and general appearance of the head, trunk, and tail; but the dorsal scales are smooth, and the labials are square, equal; (frenal, one.)

HOMALOPSIS SIEBOLDI, Schelgel.

SYN.—Seba, II, Tab. 46, Fig. 2?

Young. Ground colour, white, which on the upper part of the head appears in the shape of two lines diverging from the muzzle over the eyes to the sides of the head. From each side of the vertical shield a line diverging towards the hind head, where it branches in two, sending a portion transversely to the throat, and another to the upper part of the neck joining under an angle that of the opposite side. On the trunk and tail the ground colour shows itself as numerous narrow, transversal bands, which on the centre are frequently interrupted and placed in quincunx series; on the sides the bands are bipartite. The intervals between the ground colour are chestnut with dark brown edges. The lips and the abdominal surface white with numerous pale brown irregular spots. Iris greyish with a transversal black bar; pupil elliptical, tongue white.*

Scuta 155, Scutella 48.

HABIT.—*Malayan Peninsula.*

Bengal.

The description is taken from a solitary young individual, which was killed in Province Wellesley. It measured,

* *Adult.*—A preserved specimen in the Museum of the Asiatic Society differs from the young in having the head above of a uniform colour, while the rest of the peculiar design is retained. The ground colour is yellowish white; the brown of the young is faded to a dull lead grey.—Scuta 156, Scutella 55.—Dimensions: head $0\frac{7}{8}$ inch: trunk 1 ft. $8\frac{2}{3}$ inch; tail $3\frac{7}{8}$ inch = 2 ft. 1 inch.—Circumference of the neck, $1\frac{7}{8}$, of the trunk, $2\frac{3}{8}$, of the root of the tail, $1\frac{2}{3}$ inch. The locality from whence this specimen was obtained, is not known: Bengal is given by M. Schlegel.

Length of the head,	$0\frac{4}{8}$ inch.
Ditto ditto trunk,	$5\frac{7}{8}$
Ditto ditto tail,	$1\frac{5}{8}$
	<hr/>
	8 inches.

Circumference of the neck, $\frac{5}{8}$, of the trunk, $\frac{7}{8}$, of the root of the tail, $\frac{4}{8}$ inch.

In livery and in general appearance this species resembles *H. buccata*, from which it differs in the following particulars. Both the upper and the lower rostral shield are very small; the anterior frontals are much broader than long, each like a small transversely placed cone, surrounded by the nasal, (with a slit towards the lower margin,) the tetragonal frenal, and behind, by the frontal. The vertical in extent nearly equals each of the short occipitals. The eye is rather large, prominent, surrounded by a single elongated, arched præ-orbital and two post-orbitals, of which the inferior is the larger, bordering the fifth and sixth upper labials. Of the latter there are eight on each side: the fourth borders the eye below, the two posterior are broken up in small pieces. Of the 11 or 12 pairs of lower labials, the 4 nearest the angle of the mouth are the smallest. The chin is covered by three pairs of oval shields, of which the anterior is the largest, and by some minute scales. The mouth is small; the teeth minute, uniform, except the last upper maxillary tooth, which is the longest with a furrow on the convex margin. The back is slightly angular in the centre, much depressed; the sides bulging; the abdomen narrow. The anterior part of the trunk is covered with 29, the posterior with 19 series of small smooth, imbricate scales, all rhombic with rounded points. The tail is tapering and compressed.

HOMALOPSIS ENHYDRIS, (Schneider.)

SYN.—Russell, I. Pl. 30. Mutta Pam, Ally Pam.

- Hydrus enhydris, Schneider.
- Enhydris cœrulea, Latreille.
- Hydrus atrocœruleus, Shaw.
- Coluber pythonissa, Daudin.
- Homalopsis aer,* Boie.
- Hypsirhina, Wagler.
- Potamophis lushingtonii, Cantor.
- Homalopsis aer, Schlegel.
- Homalopsis olivaceus, Cantor.

* This specific name is singularly ill chosen, as the denomination "*ular ayer*," (water-serpent,) is applied by the Malays to all fresh water serpents. The word "*ayer*" applied to a single species is as eligible as would be "*aqua*," "*ean*" or "*wasser*."

Iridescent dark greenish-or brownish-olive above; the scales edged with black; in some two parallel light greyish lines from between the eyes to the tip of the tail; the lower half of the sides pale greenish or brownish-grey; lips and throat white, edged and dotted with black. Abdominal surface white or buff, with a greenish or brownish line on each side, and a black central line dividing the scuta and scutella. Iris greyish or pale olive; pupil circular; tongue whitish.

Young: with lighter and more strongly iridescent colours than the adult.

Scuta 148 to 167; Scutella 53 to 71.

HABIT.—*Malayan Peninsula and Islands.*

Java, Tenasserim, Bengal, Coromandel.

The head is small, ovate, scarcely distinct; the nostrils are hemispherical, with a slit towards the external margin of the shield; the single anterior frontal is small, rhomboidal, much broader than long; the eye is rather large, prominent, lateral and surrounded by two rather broad post-orbitals, one or two narrow præ-orbitals, and beneath by the fourth upper labial; the frenal is small, rhombic. The external margins of the occipitals are bordered by three elongated shields, and each temple by five similar. The eight upper labials are larger than the ten lower. The chin is covered by two central pairs of elongated shields, between which and the labials is, on each side, a single very elongated shield. The mouth is small, the teeth minute, numerous and equal, except the last tooth of the upper jaw, which is longer than the rest and furrowed. The trunk is very robust, broadly depressed; the sides obliquely compressed, and the abdomen very narrow, flattened. The scales are broad rhomboidal with rounded points, slightly imbricate, and disposed on the anterior part in 25, in the middle in 21, and near the tail in 19 longitudinal series. The tail is very slender, somewhat compressed, tapering and prehensile. The largest individual was of the following dimensions:—

Length of the head,	0 ft.	1 inch.
Ditto ditto trunk,	1	$5\frac{5}{8}$
Ditto ditto tail,	0	$5\frac{2}{8}$
	<hr/>	
	2 ft.	

Circumference of the neck, $1\frac{2}{8}$, of the trunk, $2\frac{5}{8}$, of the root of the tail, $\frac{7}{8}$ inch.

Numbers of this species may be seen in rivers, as well as in irrigated fields and estuaries, preying upon fishes, which however it refuses in a state of captivity. It is of timid and peaceful habits. A large female, after having been confined upwards of six months in a glass vessel filled with water, brought forth eleven young ones in the manner noted above under *Acrochordus javanicus*. During the process she lay motionless on the bottom of the vessel, the anterior part of the abdomen was retracted towards the vertebral column, while the muscles of the posterior part were in activity. Shortly after the parturition she expired under a few spasmodic movements, and also two of the young ones died in the course of about two hours, after having, like the rest, shed the integuments. In length they varied from 6 inches to $6\frac{2}{3}$. The living nine presented a singular appearance: they remained a little way below the surface of the water coiling themselves round the body of an adult male, which was also kept in the vessel, occasionally lifting the heads above the surface to breathe, at the same time resisting the efforts of the senior to free himself. Fishes and aquatic insects were refused, in consequence of which the young ones expired from inanition in the course of less than two months.

HOMALOPSIS PLUMBEA, Boie.

SYN.—*Hypsirhina*, Wagler.

Hypsirhina hardwickii, Gray: *Illust. Ind. Zool.*

Homalopsis plumbea, Schlegel.

Iridescent dark brownish-or greyish-olive above, uniformly or with small irregular black spots; the two or three lowest series of scales yellowish, each scale spotted or edged with brown; lips and throat yellow; scuta and scutella yellowish white, the former in some partially edged with black, the latter with a black central zig-zag line; iris grey; pupil elliptical, vertically contracted by the light; tongue whitish.

Scuta 125 to 126; Scutella 36 to 44.

HABIT.—*Pinang*.

Java.

The head is broad, ovate, depressed; the muzzle blunt, the nostrils small triangular, with a slit towards the lower margin of the nasal; the single anterior frontal broad triangular; the rest of the crown shields are of normal form. The eye is small, placed in a half lateral half

vertical position, enclosed by two post-orbitals, one elongated præ-orbital, and beneath by the fourth upper labial; the frenal is very small, tetragonal; the upper labials eight, rather high; lower labials ten; on both jaws the shields increase in size towards the angle of the mouth. The chin is covered with two pairs of elongated shields and a few gulars. The mouth is small; the posterior upper maxillary tooth longer than the rest, furrowed, and the anterior lower maxillary teeth also exceed the following. In addition to the fixed teeth there are several accessory series. The trunk is nearly cylindrical, slightly depressed, covered with small rhombic scales, smooth, and not imbricate, disposed on the anterior part in 19, on the posterior part in 17 longitudinal series. The tail is short, conic, tapering and slightly prehensile. Two individuals, taken at different times in rivulets in the valley of Pinang, in habits resembled *H. rhinchops*. The larger was of the following dimensions:

Length of the head,	0 ft.	1 $\frac{1}{8}$ inch.
Ditto ditto trunk,	1-	5
Ditto ditto tail,	0	2 $\frac{6}{8}$
		<hr/>
	1 ft.	8 $\frac{7}{8}$ inch.

Circumference of the neck, 1 $\frac{5}{8}$, of the trunk, 24 $\frac{3}{8}$, of the root of the tail, 1 $\frac{1}{8}$ inch.

HOMALOPSIS LEUCOBALIA, Schlegel, VAR. (See Plate XL. Fig. 5.)

Young.—Above light brownish olive, or greenish grey with single irregular distant brown spots; lips and throat whitish yellow; the lowest three or four lateral series of scales, and the abdominal surface greenish white or pearl-coloured.

Adult.—Uniformly blackish olive above, otherwise like the young. Iris dark brown; pupil elliptical, vertically contracted by the light. Tongue whitish.

Scuta 130 to 148; Scutella 26 to 37.

HABIT.—*Pinang, Malayan Peninsula.*

The head is very broad, depressed, and the muzzle blunt; the rostral broad, hexagonal, very slightly arched beneath; the superior margin borders the single small elongated anterior frontal, which is of a narrow hexagonal form, broader behind, where it is wedged in between the two broad frontals. The nasals are rather large; nostrils small

erescant-shaped; the vertical very broad, short, hexagonal; occipitals large, elongated with a pair of very broad shields on each side, below which the temples are covered by three smaller shields. The eye is very small, in a half vertical position, with two post-orbitals, one præ-orbital, which extends to the large oval nasal; frenal none, or, when present, excessively minute. Of the five large upper labials, the anterior is the smallest and borders the nasal; the second the præ-orbital, the third the orbit, and the lower post-orbital, the fourth and fifth the temporals. The lower rostral is very small, triangular. The seven or eight inferior labials are much smaller than the upper. The two pairs of mentals are very short. The mouth is small; the teeth are very strong, short and of nearly equal size, except the furrowed last upper maxillary tooth and the anterior teeth of the lower jaw, which are longer than the rest. The trunk is robust, back slightly raised in the centre, the sides sloping, their lower half compressed, the abdomen broad, arched. The scales are smooth, rhombic with rounded points, slightly imbricate; those of the sides have the points bent inwards and firmly adhering to the skin, so as to appear hexagonal. On the anterior part of the trunk they are disposed in 27, on the posterior in 25 longitudinal series. The tail is short, robust, tapering and somewhat prehensile. In the male the sides are compressed, very high in the middle, and the lower surface is flattened, very broad, more so than is the posterior part of the abdomen. In the female it is shorter, the sides less high, and the lower surface less broad. The largest male of a considerable number was of the following dimensions:

Length of the head,.....	0 ft.	$0\frac{7}{8}$ inch.
Ditto ditto trunk,.....	1	$10\frac{2}{3}$
Ditto ditto tail,.....	0	$2\frac{6}{8}$
	<hr/>	
	2 ft.	$1\frac{7}{8}$ inch.

Circumference of the neck, $1\frac{7}{8}$, of the trunk, $2\frac{4}{5}$, of the root of the tail, $1\frac{1}{8}$ inch. With the exception of its colours, the present offers no difference from *H. leucobalia*, from the rivers of Timor. At Pinang it is numerous not only in fresh water and estuaries, but in the sea at some distance from the shore, where it sometimes occurs in fishing nets. It is of sluggish, not fierce habits, and feeds upon fishes and crustacea, aquatic and pelagic. In a young female the oviduct enclosed

4 white cylindrical eggs, which when they were observed contained but yolk; each measured about an inch in length.

HOMALOPSIS HYDRINA, N. S. (See Plate, Fig. 4.)

Adult.—Ash-coloured above with a few scattered black spots on the neck; the back and tail with numerous transversal black bands; the lips, sides and abdomen uniformly pearl-coloured. Iris ashy; pupil elliptical, vertically contracted by the light; tongue small, whitish.

Scuta 161; Scutella 34.

Young.—Resembling the adult, but the ash-colour of a much lighter shade.

Scuta 153; Scutella 35.

HABIT.—*Sea off Pinang, and the Malayan Peninsula.*

The head is moderately distinct, elongated, depressed, oval with rounded, blunt muzzle; the rostral shield moderate, hexagonal; its lower margin with a central minute tubercle, on each side of which a triangular impression. The upper margin of the minute triangular lower rostral presents a central cavity, and two lateral elevations fitting into the margin of the upper rostral. A similar contrivance in the pelagic serpents enables them hermetically to close the mouth. As in *H. leucobalia*, the single small anterior frontal is elongated hexagonal, broader behind, and enclosed by the rostral, the nasals, and the frontals. Although the nasals are placed laterally, the small arched linear nostrils open vertically, and send a slit to the posterior margin of the shield; the frontals are hexagonal, smaller than the latter; the vertical is the longest of the crown-shields, very narrow, hexagonal, pointed at both extremities, but broader behind; the supra-orbitals are small, narrow; the occipitals are broken up in minor shields: viz. two post-occipitals, in size equal to the occipitals, and a minute conical inter-occipital, enclosed by the four shields, with the broader extremity wedged in between the occipitals. Each temple is covered with two pairs of large shields, of which the lower borders the fifth, sixth, and seventh upper labials. The eye is very minute, prominent, almost vertically placed, surrounded by two post-orbitals, of which the lower is broad pentagonal, meeting beneath the elongated single oblique præ-orbital. Thus none of the upper labials border the orbit. The frenal is moderate, pentagonal. Of the seven upper labials the anterior three

pairs are much smaller than the rest, which suddenly become very large and deep, so as to make the margin of the lip very bulging in a downward direction. The lower ten or eleven labials are smaller than the upper, except the sixth, which is the largest. The chin with two pairs of shields of which the anterior is very elongated; the throat with numerous minute scales. The mouth is small, the dentition resembles that of *Homalopsis leucobalia*, Var. The trunk would be orbicular, but for the narrow flattened abdomen, the scuta of which are angulated, forming on each side a sharp ridge. The scales are very small, smooth, on the neck disposed in 33, successively in 37, but near the root of the tail in 29 longitudinal series. Those of the back are rhomboidal with rounded points; those of the sides lanceolate with the point bent inwards, so as to appear truncated, each scale leaving a small square interval, in which appears the naked skin. The tail is short, much compressed, tapering and slightly prehensile. In the male the sides are very high, and the lower surface very broad, as noted under *H. leucobalia*, Var. On the broadest part there are as many as 21 longitudinal series of scales. In the female this organ is shorter, the sides less high, and the abdomen less broad.

Of three individuals observed, two were captured in fishing stakes placed in the sea off the shores of Keddah, a third was washed on shore by the waves on the coast adjoining my house at Pinang. The largest male was of the following dimensions :

Length of the head,	0 ft.	0 $\frac{5}{8}$ inch.
Ditto ditto trunk,	1	4 $\frac{4}{8}$
Ditto ditto tail,	0	2 $\frac{2}{8}$
	<hr/>	
	1 ft.	7 $\frac{3}{8}$ inch.

Circumference of the neck, $\frac{6}{8}$, of the trunk, 1 $\frac{6}{8}$, of the root of the tail, $\frac{7}{8}$, of the middle of the tail, 1; two eighths from the apex, $\frac{3}{8}$ inch.

It moved actively and without difficulty on the sand, and did not offer to bite. In one examined the stomach contained remains of two small pelagic fishes. In general appearance and colours the present is more closely allied to the pelagic serpents than any other known species. Whether it exclusively inhabits the sea, or, like *Homalopsis rhinchops*, *enhydrus*, and *leucobalia*, as an occasional visitor, must be a matter of future investigation.

(To be concluded in our next.)

Notes on Places in the Province of Behar, supposed to be those described by Chy-Fa-Hian, the Chinese Buddhist Priest, who made a pilgrimage to India, at the close of the fourth century A. D. ; by Captain M. KITTOE, 6th Regiment, N. I.

In my former notes on the Viharas of Magadha or Behar, I expressed my desire to examine Rajagriha, Burgaon, Behar and Pawapuri. I have lately been enabled to pay a hurried visit to several of these places, which I was induced to do more particularly, after perusal of extracts from Remusat's translation of the Travels of Chy-Fa-Hian, [made at the close of the fourth century of the Christian era] obligingly furnished by our co-Secretary, Mr. J. W. Laidlay : these extracts are here given for ready reference.

Had I had full leisure and the season been more favourable, I should, no doubt, have been able to have made a better harvest of information than I have by such a hurried trip, with a burning sun and oppressive heat, which forbade much roaming about the rocks and jungles ; indeed, as it is, I suffered severely.

It would have been better could I have taken Patna, (Pa-lian-fou, Pataliputra) as my starting point, and from thence have followed in the very tract of Fa-Hian to "the little hill of the isolated rock," but unable to do this, I sent a trust-worthy servant to Behar and have perused Buchanan's notice of the same place and its curiosities ; also to another spot held sacred by the Jains called Pawapuri lying between that and Girryek. The remainder of the route I have traced myself.

"Chap. XXVII. Departing from thence (Pataliputra, Pa-lian-fou) towards the south-east nine *yeou yans* bring you to " *the little hill of the isolated rock.*" Now assuming the *yeou yan* to be the डायन "yoyun" or "jojun" of the Sanserit, which is equal to four क्रोश or kos, our pilgrim will have travelled thirty-six miles in a south-easterly direction, as near as can be that of Behar ; no intermediate spot is mentioned, nor can I hear of any which could have attracted his particular attention ; he describes the place (Behar?) as the "little hill of the isolated rock." "On the top of this rock is a stone building, facing towards the south : Foé being seated there, the king of heaven, Chy (Indra), made the celestial musicians *Pant che* play on the *khin*,"*

* A kind of lyre.

in honor of him. The king of heaven Chy questioned Foé regarding the forty-two things, drawing every one of them with his finger upon the stone: the traces of these drawings remain there still. In this place there is also a *Seng-kia-lan*, (monastery.)”

Now, first of all, as to the “isolated rock” and the “monastery,” these two remarkable objects are surely not to be mistaken! As to the first, there is a bare rock near the site of the fort of Behar, on which is placed a durgah or shrine of a Muhammadan saint, as well as traces of other buildings; there is no tradition concerning its being held sacred by Hindus or Jains, that I could learn, though Behar itself is venerated by the latter: however, the very fact of a “Sheheed’s durgah” or shrine of a Muhammadan martyr would strengthen my belief, that some sanctity was attached to the site at the time of the fall of the Moslem there enshrined, such being invariably the case in all parts of India. I, therefore, presume, that this is the “little hill of the isolated rock,” and the “Seng-kia-lan” or monastery was the great Vihara from which Behar takes its name, the site of it being now occupied by the ruins of Sher Shah’s fort.

Buchanan (see Montgomery Martin’s compilation) vol. I. p. 92, adds, that there is also a large conical mound called a punzawa (brick-kiln) a name given as we shall see to other mounds of the same kind which were undoubtedly Dehgopes or Chaityas: I would refer my readers for more ample details to the above named work: other hills are also named.

I have taken much pains to ascertain, whether Behar anciently bore any other name than simply Vihar, but have been unsuccessful, though I am inclined to think it must have, so greatly have the names of places changed, and so many cities have been razed to the ground, that the locality must ever be a difficult point to decide, nothing indeed except such circumstantial records, as our Chinese traveller affords, could help us out of the difficulty; in this light, for one, then, are his travels valuable, and tracing his track may not be a profitless undertaking.

We must now leave Behar and proceed to the South West.

“Thence proceeding to the S. W. for one *yeou yan* you come to the hamlet of Na-lo. This is the place where Ché-li-foe (Sariputra) was born, and here he entered nirvána. They have here built a tower, which still exists.”



It is somewhat difficult to follow the track here and to fix Na-lo, for in a south-westerly direction, taking a wide range of that quarter of the compass, we have several places sites of Jain and Buddhist relics ; first of all, farthest east is “Pawapuri” held sacred up to this time by the Jains, being the spot where Mahivira Swami died : his “churun” or feet marks are placed in the centre of a large tank on an island which is approached by an embankment and bridge, this and other expensive works, would seem from an inscription, (of which I annex a copy) to have been executed about 500 years ago, by rich merchants of the Saraw⁶ east : there are no remains here which would indicate the previous existence of a tower or chaitya, though from Mahavira dying at this place, I should be inclined to think, that it must have been one of sanctity belonging to the Buddhists and Jains, which latter are, I believe, merely a heretical offset. The distance from Behar is three coss, which is less than one yojun.

The next place, further to the west of south is the village of Girryek, and the hill of that name on the top of which is an ancient tower called Jarasindh-ka-bytuki, and attributed to that monarch. There are many ruins of gigantic works here, among which is a causeway leading from the Panchanné rivulet up the hill to the tower, a description of which may be found in Buchanan, vol. I. p. 79, and in the Journal A. S. vol. VIII. p. 353—there is also the site of a large town on the eastern side of the river close to the modern village of Girryek. I am scarcely inclined to suppose this place to be Na-lo, on account of its being so close to the “Gridhra-kuta” and Buddha’s cave, together with other remarkable features of the place which would have hardly been overlooked, and it seems strange that the pilgrim should have gone so far out of his way (on to Rajagriha) to return to the “Gridhra-kuta” caves ; the direction of Rajagriha, however, is westerly, and so far answers to our traveller’s bearings.

Another spot, six miles in a more westerly direction, is that called “Burgaon,” where there are several high tumuli, also many fine sculptures, numerous large tanks and wells, the ruins are most extensive ; the ancient name of this town was Kündilpur, and is mentioned in the Bhagavut, and in the Jain books, it is nearly due north of Rajagriha, about 7 miles. I can again hardly think that such a place could have escaped the notice of so observant a person as Fa-Hian. In the

history of Sakya, I find the name "Nulita," a spot near Rajagriha where he expounded some of his doctrines, but here again I am at a loss as no such name now exists, and all knowledge of Buddhist history as far as regards the people of Magadha, has long since been lost to them.

There is a place called Jyudeespur about two miles from Bargaon, where there are the remains of a large tumulus, and a very fine image of Buddha; this spot takes us even further out of the proper direction, as regards Rajagriha, which is nearly due north and south, distant however about 7 miles.

With this list of noted spots before us, it is difficult to decide which is the one called Na-lo,* if the term "tower" were only applied in one sense, we should fix upon Girryek, but it is evident that it applies to the tumuli or chaityas, and there must have been more than one at this place in Fa-Hian's time, though certainly it is a very remarkable object, being seen for many miles, its direction from Behar as well as with Rajagriha is correct, the distance is a little less, being between 6 and 7 miles, upon the whole, however, I am inclined to fix Na-lo here. We shall now proceed to Rajagriha, "the new town of the Royal residence." "One yojun west of Na-lo, brings you to *the new town of the Royal residence.*" This town was constructed by the king A-tche-chi: it has two monasteries; on leaving it at the western gate, at three hundred paces you come to a tower, lofty, grand, majestic, and beautiful, which A-tché-chi erected when he obtained some of the relics of Foè."

I here commence my own route to trace that of Fa-Hian; it was circuitous owing to the low land beneath the hills, which you have to your left hand about a mile distant, the whole way up to the modern village and site of ancient Rajagriha. An immense embankment called "Assurein" still exists, as well as extensive mounds of bricks and rubbish; sufficient remains of the citadel to show its form, a parallelogram

* In the Páli Buddhistical Annals Sákya is stated to have halted at *Nálanda*, one yojana distant from Rajagaha, when en route from the latter place to Pataligámo (Pataliputra). In the *Na lo* of our Chinese author, there is little doubt that we have the transcription of *Nálanda*; the original word being, as is not unusual in such cases, lopped of a syllable or two. This identification is further confirmed by the circumstance of Sákya Muni holding in this place a discourse with his disciple Sariputra (*Che li foé*), whom he may be supposed to have fallen in with at his native village upon the occasion of this journey. *Na lo* is called by Huan Tshang, a subsequent Chinese visitor, *Kia lo pi na kia*. The last two syllables are no doubt the transcription of *nagara*.—EDS.

with numerous bastions; but these latter appear to have been the work of later times, indeed a story is told that Shershah whilst erecting these works, was ridiculed by a milkmaid, who showed him that the adjacent hills completely commanded it, (which they do with artillery). He then abandoned it.

About the distance westward described by Fa-Hian, there exists a tumulus called the "awa," or Punzawa, which is no doubt the "tower," (chaitya) where Buddha's relics were placed by A-tché-chi; Buchanan vol. I. pp. 88, 89, describes this remarkable mound which want of leisure prevented me closely inspecting. This is, no doubt, the chaitya erected over Sákya's relics, built by Ajata-suttu, when he obtained them from Kama Rupa. See history of Sákya's death, vol. XIX. Asiatic Researches. Here then we find one instance of the accuracy of our traveller; let us follow him into "the valley of the five hills."

"Chap. XXVIII. On leaving the town on the south side, at the distance of four "li" you come to a valley which leads to the "five hills:" these five hills form a girdle, like the walls of a town: this is the ancient town of the king "Ping-Cha" (the old Rajgriha). From the east to the west is six "li," and from the north to the south seven or eight; this is the place where "Che-li-foe" and "Mou lian" first met O pi (अश्वजित Asvajit). At the north-east angle of the town the ancients erected a chapel in the garden, where An-pho-ló invited Foe and twelve hundred of his disciples to do them honor; this chapel still exists. The town is entirely deserted and uninhabited."

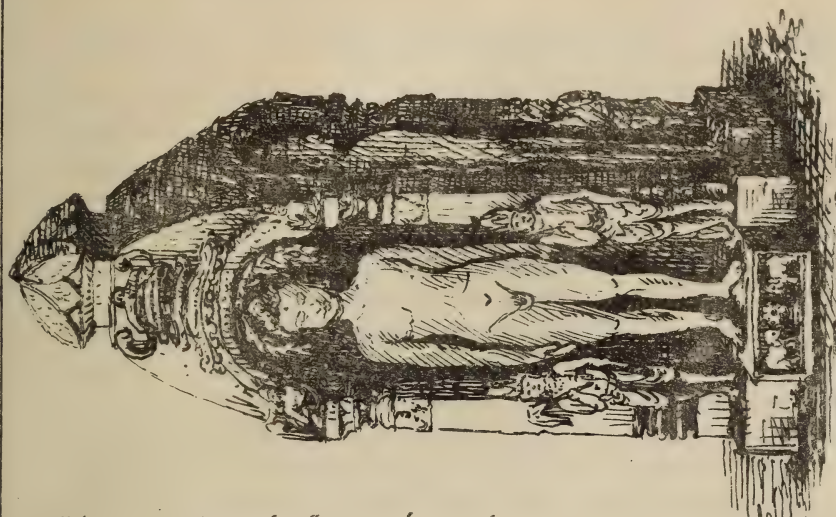
From Rajgriha, it is about a mile to the entrance of the valley where the hot springs flow, and where a fair is held every third year, having an intercalary month, it lasts during the whole of such month at whatsoever season it may fall; the fair was full during my visit. In May various virtues are ascribed to these springs; barren women resort to them from far and near. Several neat temples have been built within the last century. There are some springs under the eastern hill of the pass venerated by the Muhammadans, who in olden times, built a durgah which is much frequented.

The appearance of this valley and hills is very striking, every peak has a name, and a small Jain temple crowning it, this sect holding the whole neighbourhood sacred, which is very remarkable.

There are two old works in existence, describing this curious tract of country, called the Rajgriha Muhatma: one belongs to the Hindus, the other to the Jains, which I am told, to be widely different. I hope to be able to procure a good copy of each and to compare them. I have had occasion to observe, that the Jains hold most of the places, supposed to be of Buddhist origin, sacred, to wit, the caves of Kundgiri in Cuttuck, Girinar in Kutch, &c. &c.

It is fully two miles or "four li" to the site of the old town which is now called "Hansu Taur," this must have been a very large place when in its glory, and (as described) is skirted by hills, five of which are more conspicuous than the rest, and are called respectively Rutna Girri, Bipla Girri, Baibhar Girri, Sona Girri, and Udhaya Girri, reference to the annexed sketch map will better explain the situation of all I shall have to describe. To proceed, first of all, as to the "chapel" in the northern hill, on the left or west side of the pass is a chamber called Sône Bhundar of precisely the same shape as those of Barabur. There are sockets to admit of timber roofing on the exterior of the cave, and there have been buildings extending to some distance in front: it would be interesting to clear the rubbish here. There are several short inscriptions and some of the shell-shape, one has some resemblance to Chinese, (vide plate) there are no Pâli letters, but the cave has been sadly ill used by a zemindar, who tried to blow it up with powder many years ago, hoping to find hidden treasure, and a large piece of rock has been broken away at the very spot where we should have expected to find the inscription,—the rock is soft and easily injured, there are some rude outlines of Budhas cut on it: there is a handsome Jain (miniature) temple, much mutilated, which is also remarkable, for each of the four figures has a vahun or cognizance, the same as those of the Gyani Buddhas, on similar temples or stones of undoubted Buddha origin, unfortunately there is no inscription to help us, (see plate)—this cave is venerated by both Hindus and Jains. Whether it be the temple Fa-Hian alludes to, it is hard to say, for there are remains in the north-east corner likewise.

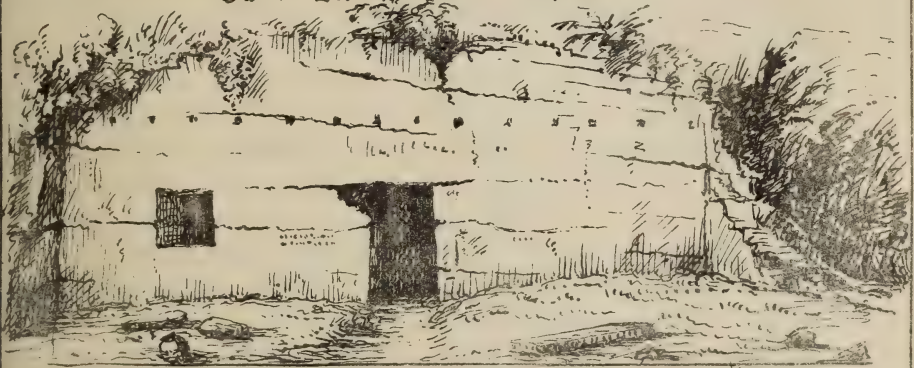
To the south of this cave near the centre of the town? is a high tumulus, the site of a Dagope or Chaitya, on which is a small Jain temple, it is called by the Hindus Munniarkoop, and by the Jains Niz-mile-koop, each have their fables connected with it. From this elevated



JAIN CHAITYA IN THE CAVE

The cave is 33'-9" x 17' x 11'-7" to spring of arch 6'-7" x 5'-8" x 5'-8" Door Ht 6'-5" Wt 2'-10" Cella 3'-3"

SŌN BHUNDAR CAVE.



SKETCH MAP OF RAJA GRIHA HILLS &c.



spot, a good view is to be had of the valley and of the pass and plains beyond, looking over Rajgriha nearly due north: to the east the valley grows narrower for a mile or so, and thence two valleys branch off, one leading under the Gidhona peak, so named from the vultures, which perch and build their nests there, the other to Tupobun where there are other hot wells; this place is also held sacred and a fair is held at the vernal equinox. Before reaching the bifurcation of the valley is a spot called the "Panch-pandub" and "Rungbhoomi" from the different ascetics take a colored earth with which they besmear their bodies. Turning to the east, the valley extends for six or seven miles, gradually narrowing to the "Guddehdwar" pass, which opens into the plains at the easternmost end of the cluster, of which more hereafter.

To the north-east is the hill called "Rutna Girri," up the acclivity of this runs a wall of loose stones in a zigzag shape, from the base of which and of the hill is seen an immense embankment called "Nek-pay," extending across the widest part of the valley (above one mile) north and south, and from its southern end again a much more massive wall is continued to the summit of the high hill called "Udhaya Girri," along the top of which the same is continued for a great distance, both east and west, whether these walls, which are not high, were intended as fortifications or fences, as said by some, to enclose a Shikargah or preserve, it would be difficult to decide, indeed there are so many curious remains, that one is completely at a loss,—the people ascribe all to enchantment and to demons.

A second high embankment stretches from the "Nekpay" almost at right angles, till it reaches the Sona Girri hill, the lowest and eastern spur of which projects to about the middle of the valley.

Leaving the tumulus and proceeding southward to this cross bank or wall and passing through the same, the road winds at the foot of the Sona Girri close to a low ledge of laterite forming a terrace as even as if cut by masons; this place is called "Bheem Sen's Ukhara," or wrestling place. The many indentations and cavities, peculiar to such formations, are supposed by the ignorant, to be marks left by the wrestlers. Continuing to the southward towards Udhaya Girri, the road is formed by the bare rock in which occur many short inscriptions in the shell pattern, and other curious forms but much worn and some overgrown with moss and rubbish. I deem these to be great curiosities, and think that

if a clearance were made more (and perfect ones) would be discovered. I copied one or two which are represented (see plate). About a quarter of a mile further, is a tumulus overgrown with jungle and near to it remains of some extensive enclosure and buildings. This tumulus may be one of the "*towers*" alluded to by Fa-Hian; at this spot the road has wound to the south-west, and the valley forms a large amphitheatre; continuing for half a mile in a more southerly direction, you arrive at a narrow rocky gorge and bed of a Nulla called "Ban Gunga," which empties itself into the plains just beyond, at the foot of the Udhaya Girri hill; the great wall at this place is very thick and extends for a considerable distance to the south; this spot is held sacred by the Hindoos who say that Bheem drove his "ban" or dart into the rock upon which water rose from "patal," [the depth of the earth;] this is one of the spots visited during the triennial fair.

Having now described the valley, &c. we must return to Fa-Hian's narrative—he says:—

"Chap. XXIX. Entering the valley and going beyond the mountains fifteen li S. E. you come to the peak of "Khi-tche." At the distance of three li, from the summit of this mountain there is a cave facing the south. Foe sat there in meditation. At thirty paces to the N. E. there is a stone grotto; "*A nan*" (Ananda) sat there meditating. The demon of the Heaven, "*Phi siun*" (विशुन), changed into a vulture, stopped before the cave and terrified *A nan*. Foe by his supernatural power opened the rock, seized *A nan* by the arm with his hand, and stayed his fear; the traces of the bird and the hole where Foe put forth his hand exist to this day. It is thus that the hill came to be named "the hill of the cave of the vulture." Before the hill is the throne of the four Buddhas. All the Arhans had also there every one his cave, where they sat to meditate. The number of these caves is several hundreds."

With reference to the foregoing, and the notes by M. Remusat and others, I first of all made every possible enquiry to little purpose, except that two caves existed about seven miles distant at the eastern gorge of the valley called the "Guddeh-dwar" or ass's gate before alluded to, I therefore determined to examine it: having no horse and it being impracticable for my palkee, I took guides and proceeded on foot at four P. M. and after two hours' good walking I reached the

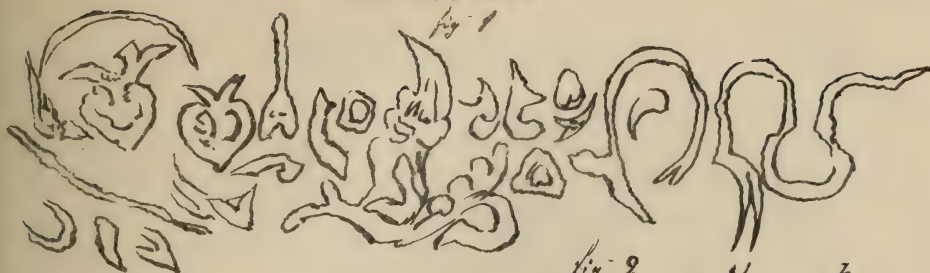


fig 2 on the rock

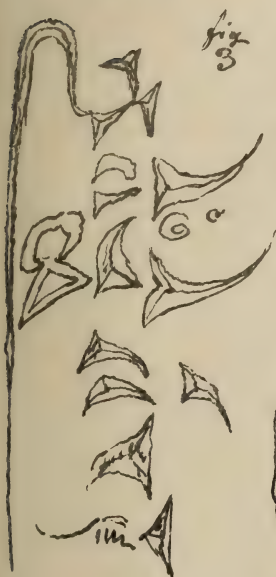


fig 3

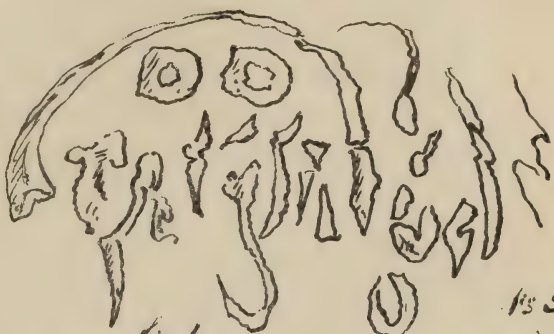


fig 4

fig 5

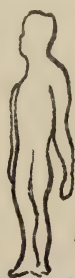


fig 8

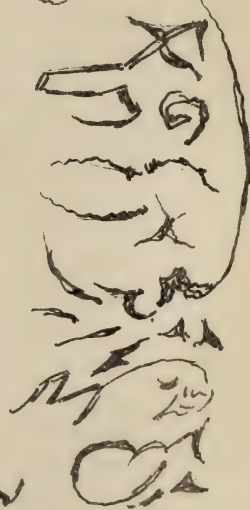
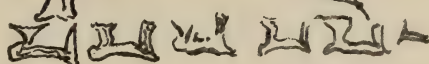
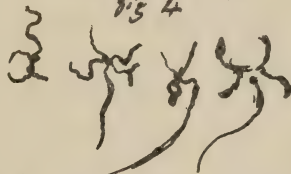


fig 6

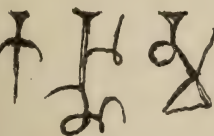


fig 7

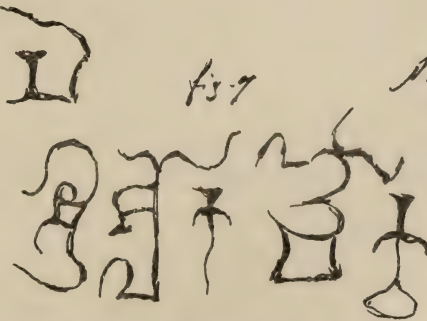


Fig. 9

ॐ शुभं नमो भगवते वासुदेवाय ॥ श्रीगणेशाय नमः ॥
 ॐ नमो भगवते वासुदेवाय ॥ श्रीगणेशाय नमः ॥

"Guddeh-dwar," a narrow passage between scarp'd rocks which had in former times been enclosed by an immense wall of loose rubble; this gorge opens out into the plain with high, barren, rocky hills, on either side, forming the easternmost of the Rajgriha cluster and range: the one to the left or north being that on which Jarasindha's tower stands with other ruins already described under the head of Girryeck.

The distance travelled will have been close upon "fifteen li" or about seven and a half miles as stated by our pilgrim: passing through the gorge and about half way up the steep face of the north hill under Girryeck, two caverns appear facing the south, and over one is a curious cleft in the rock which would seem to answer Fa-Hian's description, except his distances, up to, and between the caves, nor are there other caves or grottos, nor the throne of the previous Buddhas. However, it is possible that these caves have a northern entrance; for the largest which is alone accessible, has a passage apparently cut through the hill, which I was unable to penetrate, not only owing to fatigue and blistered feet, but it would be requisite to be provided with chloride of lime, torches and other precautions to enable a party to explore it. I think it would be found to open out opposite the highest peak south of Jarasindha's tower; this peak is surmounted by either a terrace or the remains of a Dagope, which may be the very "throne" alluded to by Fa-Hian, as its distance from the path below would answer that given: I think then we may fairly decide that these caves are the identical ones described by him, there are small cavities here and there which may have been used by anchorites but not several hundreds. By "stone grottos," may be meant small habitations made of stones piled together; indeed I think it more than probable, that the whole of these hills were inhabited by "rishis" or devotees, the name "Tupobun" itself implies it, being a corruption of "Tupissia" and "Vana" or forest of devotion.

There are some more hot springs beneath the southern side of these easternmost hills, and about five miles further south in the plains is a spot (a tank) still visited and held sacred by the Jains.

As to the name "Gridhra-kuta" the present one of "Guddeh dwar" may be a corruption of "Gridha dwara:" vultures swarm alike on all the ragged peaks and particularly on these.

Chap. XXXI. "Thence proceeding to the west four *yeou yans* you come to Kia-ye. This town also is completely deserted."

Now if we take the distance of four *yojuns* to *Kia-ye* (*Gaya*) modern *Gaya* would answer, but if we are guided by the direction, it is too much to the southward of west, if on the other hand we be guided by the bearing and less by the distance, we should decide that by "*Kia-ye*" was meant the ancient *Gaya* now known as "*Ram Gya*," which is on the west or right bank of the *Phulgo* and a mile to the north of the *Barabur* hills. There is a tradition that all ceremonies were formerly performed here; a fair is held in the month of April, at which still, the lower casts perform the "*Pind*" or ceremony of offering the funeral cake. *Hoolasgunge*, which is further east, consequently nearer the distance given (of four *yojuns*) is by some supposed to have been ancient *Gaya*, (see *Buchanan*, Vol. I. p. 100.) It is strange that *Fa-Hian* mentions neither the *Phulgo* (or *Mohana*) nor its branch stream which, had he gone to *Ram-Gya*, he must have crossed; it is also remarkable that he does not allude to the *Barabur* caves or hills, places which must have been of note even in his time, however, it is possible that they were in possession of heretics or of Hindus, for from the later inscriptions we learn that *Sardula Varma*, *Annund Varma*, &c. appropriated the caves and set up *brāhmānical* images, the same reason may be assigned, for no mention being made of *Kundilpur* or *Burgaon*, but let us now turn to the south.

"Going to the south twenty li, you come to where the *Phou-sa* spent six years in mortifications; the place is woody. Thence going three li to the west you come to where *Foé* descended into the water to bathe; the gods held branches of trees over him when coming out of the pool (or tank). Two li further to the north, you come to the place where the young women of secluded families offered *Foé* rice and milk: thence to the north two li more, to where *Foé* sat on a stone, turned to the east, under a great tree; the tree and the stone exist to this day. The stone is six feet long and six broad. In the kingdom of the middle (*Magadha*) the temperature is so equable that trees last several thousand years, even ten thousand."

We now come to the most perplexing part of our pilgrim's narrative, for not only do his bearings but his distances puzzle us, the indiscriminate use of li and *yojun* is one cause.* Now if *Hoolasgunje* or

* With regard to the length of the *yojana*, we must not expect to find extreme precision in the narrative of *Fa-hian*. That traveller no doubt set down his distances from

Ram-Gya be Kia-ye and a "li" be equal to as much as half a mile, we should have ten miles south, which would only bring us within six miles of the Vishnupad, four of the Ramsila hill, and twelve of Budh Gya which the others believe to be the holy locality (see Vol. XIX. Asiatic Researches, p. 187.) It is there mentioned in a note, that there are seven places held sacred called the "Satta Stana," three of which only answer to the description given by Fa-Hian, viz. the two trees and the tank where Buddha was protected from the rain by a dragon: (Seshnag?) the Vakeels, however, name four, as the only spots now visible: the distances of all are given except of the hill and Bukrowr ("Bagaroo Goun)," this hill is no doubt the same under which is the lake called Mórátal.

Fa-Hian leaves you in doubt as to whether by "pool" (where Buddha performed his ablutions) was meant a pool in the river, or a tank or lake; the Burmese seem to believe in the latter, though in the Tibetan books the "Nirajuna" (Lillajun) is distinctly mentioned; but to return to the narrative.

"Thence going to the north-east half a *yeou yan*, you come to a stone grotto; *Phou sa* entering it and facing the west, sat with his legs crossed, and thought within himself "in order that I should accomplish the law, I must have a divine testimonial." Immediately his shadow depicted itself upon the wall; it was three feet high; the weather was clear and brilliant; heaven and earth were both moved, and all the gods in that space exclaimed, it is not in this place that all the Foés past and to come should accomplish the law."

Now, before proceeding further, I must remark, that if Buddha Gaya is the spot meant by Fa-Hian, we must give up all idea of his having gone west from Rajgriha and assume that his route was continued from the Ban Gunga or from Buddha's cave (the Guddeh-dwar) directly west to some deserted place opposite modern Gaya, and then have turned south

popular estimation, and the *yojana* will therefore vary in different localities precisely as we find the Kros to do at the present day. From the comparison of the actual distances of well identified places in the north-western Provinces with those given by Fa-hian, Capt. A. Cunningham (Jour. Roy. As. Soc. Vol. VII. p. 243) determines the length of the ancient *yojana* to be a fraction more than 7 English miles. This will be found rather too much when applied to Fa-hian's distances in Magadha. Mr. Turnour (Mahawanso, p. 30 of the glossary) makes the *yojana* equal to sixteen E. miles; a valuation manifestly excessive.—EDS.

along the right bank of the Phulgo (the Lillajun is here so called) to Bukrowr and Buddha Gaya, which is directly opposite across the Lillajun, and here again he makes no mention of that great river (it is next to impossible (now that no tradition even is left) to trace each particular spot, it would seem certain however, that one tree was at Bukrowr and the other at Bodh Gaya, which tree is now called the Sutjug Peepul, the first I assume to be "Ni-kiu-liu" "the tree of all the Buddhas." The second, Pei-to "there have been Chaityas at both places, and no doubt long before Fa-Hian's time, there was, as I have mentioned in my "Notes on the sculptures of Budh Gaya," more than one very ancient Dagope, and I believe the trees to have had enclosures as represented in those sculptures, also in the caves of Kundgirri in Cuttack and in other Buddhist sculptures. The hill beneath which is Moratal lake, lies about two miles or less north of Bukrowr: there are spots on this hill still venerated by the Hindoos, and as it runs north and south, consequently faces west, and as the distance answers tolerably well, I should be inclined to consider it to be that alluded to, on which "Buddha sat facing the west."

Bukrowr is due east of Buddha Gaya, having only the wide bed of the river between them, the large tumulus and remains of a Dagope may be three furlongs or even half a mile due east of the great Budh Munder and Peepul tree. About a furlong east by south of the tumulus is a tank held sacred by both Buddhist and Hindus, it is not far from the banks of the Mohana, on the narrow tongue of land which extends up from the junction of the two rivers, where both take the common name of Phulgo.

There are several large tanks at Budh Gaya and the mounds of brick, clay and pottery extend over a very great surface, the great Dagopes must have stood very close to the tree: and were excavations carried on, it is possible many more curious sculptures would come to light,—but to continue.

"To the south-west a little more than half a *yeou yan* is the Pei-to tree where all the Foés past, and to come, should accomplish the law. Having said this, they sang to him and showed him the way, retiring. The *Phou sa* rose, and when he was thirty paces from the tree, a god gave him the grass of happy omen; the *Phou sa* took it and advanced fifteen paces further. Five hundred blue birds ap-

proached, flew thrice round him and then flew away ; The *Phou sa* advanced to the tree *Pei-to*, held out the grass of happy omen towards the east, and sat down. Then the king of the demons sent three lovely damsels, who came from the north, to tempt him, and himself also came with the same purpose. The *Phou sa* struck the ground with his toes ; the crew of the demons recoiled and were dispersed, and the girls were transformed into old women : for six years he subjected himself to the greatest mortifications. In all these places men of later times have erected towers and carved images which exist to this day.”

I was at first inclined to think that Gaya-proper, was the site of some of Buddha's exploits, and that the Vishunpad was the very place where Buddha left the impression of his foot ; that the tree called *Achah But* आत्स्यवट where the “Pind” offerings are now made was the tree alluded to in this chapter, but the distance from the Ram-Gaya hill is too short, though the direction would be correct, however as both better answer for *Budh Gaya*, we may again consider it more probable that the latter is the proper spot. The chapter continues thus :—

“In the place where *Foé* having accomplished the law, rested seven days to contemplate the tree, and obtained the joy of extreme celestial beatitude ; in the place in which he passed seven days under the tree *Pei-to* ; in that where the gods, having created the edifice of seven precious mansions served *Foé* seven days ; in that where the blind dragon with brilliant scales surrounded *Foé* for seven days ; in that where *Foé*, being seated under a tree “*Ni-kiu-liu*,” upon a square stone and turned to the east, the god *Brahma* came and prayed to him ; in that where the four kings of the gods offered him a dish ; in that where the chief of five hundred merchants presented him with parched rice and honey ; in that in which he converted *Kia-se* and his brothers, master and disciples to the number of a thousand ; in all these places have towers been erected.”

With reference to the different places here enumerated, it seems clear that they must all have been close at hand, indeed several of them are no doubt, those described in a more fabulous and extravagant manner by the Burmese as the ‘*Satta-Stana*,’ for instance ‘the square stone under the tree’ is converted seemingly into the ‘Golden Throne.’ The ‘Edifice of the seven mansions,’ into the golden mansion, the spot

where the damsels offered milk and rice, perhaps tempted him ; the dragon with brilliant scales is, no doubt, the snake Sehsa, which protected Buddha from the rain with its hood. The "Pei-to tree" is, no doubt, "Buddha's holy tree," and the place "where goats used to graze" is probably Bukrowr. I must now again repeat that there is an ample extent of ruins to warrant the supposition, that there must have been numerous buildings around the holy tree, indeed the fact of three distinct and very ancient sets of carvings and fragments of Dagopes of the earliest forms, would strengthen our belief in the former existence of numerous edifices, such as described by Fa-Hian.

We now come to a further enumeration of places, where buildings had been erected by the Buddhists in early times.

"In all these places they have also erected towers. 1st, In the place where *Foé obtained the Law*, there are three Seng-kia-lan (Viharas) ; in each is an establishment for the priests, the number of whom is there very great. The people supply them with abundance, so that they lack nothing. They keep precepts rigidly ; they observe the greatest gravity in all their deportment ; in rising up, in sitting down, and in going abroad." This would seem to be at Buddh Gaya ; but it is doubtful, whether the remaining places enumerated, as follows, were so.

"The four great towers which have been erected in commemoration of the holy things done by Foé, during his sojourn in this world, have been conserved to the present moment (A. D. 408) since the time of his 'Nirvana' (death.) These four great towers are—first, where he was born—second, where he obtained the law—third, where he turned the wheel of the law ; and fourth, where he entered Nirvana" (died).

Now it would seem, that this does not, as I have before hinted, allude to Dagopes or Chaityas at Buddh Gaya exclusively, for in the first place Sakya, i. e. Buddha was born at Kapilavastu somewhere, it is believed, in the Oude territory. As to the second, most probably Budh Gaya was the place ; by the third I should have little doubt but that Varanasi or Benares was meant, for all the Buddhist historians record this event of the prophet's life to have taken place there, i. e. his "turning the wheel of the law ;"* the present tower of Sarnath erected evidently since Fa-

* 'Turning the wheel of the law' is a metaphorical or mystic expression, equivalent when applied to a Buddha, to 'commencing his ministration.' Benares was no doubt the

Hian's time, cannot for this reason be that alluded to, but there have been other towers, of which nothing but the bare traces now remain. By the fourth tower, (upon equally if not stronger grounds) must have been meant that at Koosha Vihara in Assam, indeed we know that it was there that Sakya obtained "Nirvana" (died). This happened beneath two Sál trees; we are further told that a Dagope or Chaitya was erected there over his ashes, and which were subsequently distributed over the country, and for which armies were even brought into the field. See life of Sakya, Vol. XIX. Researches, p. 317. I do not think the text warrants our supposing that four great towers were erected in commemoration of the four principal events of Budha's life at Gaya.

We must now turn to Chapter XXXIII, in which we learn further of the vicinity of Budh Gaya.

"From the Pei-to" tree you proceed three lí, to a hill called the *cock's foot* (कुकुटपद) "Kookootpada," it is here that the great Kya Che (Maha Kasyapa) pierced the mountain for the purpose of entering it, and suffered none else to enter the same way. At a considerable distance from this is a lateral hole, in which is the entire body of Kya

scene of this event in Sákya's life, as the following couplet from the *Lalita vistára* will testify :

वाराणसीं गमिष्यामि गत्वा वै काशिकां पुरीं ।
धर्मं चक्रं प्रवर्त्तिष्ये लोकेषु प्रतिवर्त्तितं ॥

"I will go to Benares; having arrived at the city of Káshi, I will turn the wheel of the law, which is revolving among mankind." (J. A. S. vol. VI. p. 572.)

The tower to commemorate Sákya's apotheosis was unquestionably, on the banks of the Gunduk, in the neighbourhood of Bettiah; and not in Assam as Tibetan writers allege. Fa-hian names the place *Kiu i na kié*, and Hiuan tshang, *Kiu chi na kie lo*, an obvious transcription of कुशिनगर *Kusinagara*. Mr. Liston in J. A. S. vol. VI. p. 477, describes some Buddhist remains at a village named *Kussia*, in Gorakpore, consisting of a pyramidal mound of bricks and other objects which seem well worthy of further investigation. These have reference, according to popular tradition, to *Mata Koonr*, which Mr. Prinsep took to be a corruption of *Kumára*, the god of war,—'the defunct Kumara.' Professor Wilson, however, thinks that *Mata Kuanr*, the 'dead prince,' applies to Sákya Sinha. The only difficulty in regard to this latter ascription is, that the term *prince* is never applied by Buddhists to Sákya, after his adoption of ascetic life. It is to be hoped that further enquiry will clear up this point. The subject of antiquities is by no means exhausted in the neighbourhood of the Gunduk—the *Ili lian* of Fa-hian, (हिरण्य *hiranya*, gold,) the *Hiranna-wattiya* of the Pali annals, and without doubt the *Erranoboas* of the Greeks.—EDS.

Che. The earth outside the hole is that over which Kya Che washed his hands : when the people of the country are troubled with headache, they rub themselves with this earth and the pain goes."

As the Pei-to is the starting point, and no particular direction mentioned, I assume that the cluster of hills at the southern extremity of Gaya proper, called Burrumjooeen are those alluded to, although the distance of three "li" is too short by half or more. The old town of Gaya in which is the Vishnupad, stands on a rock, a spur of the larger hills, under which the Hindoos believe, that the demon Gaya Asura is confined by the weight of Vishnu's foot.

By Kya Che the translators from the Chinese text conjecture, that Maha Kasyapa is meant,* but I am inclined to think, that it is this said Gaya Asur of the Hindoo legends. The absurd story of all the divinities failing to subdue the monster till Vishnu put him down with his foot, appears to me to be an allegory expressive of the final triumph of the Vishnuvites over the Buddhists, Vedantis, Saivas and other sects. The first and last named must have predominated here from the numerous lingas and yonis of every age and form, as well as fragments of Buddhist carvings. This subject is worthy of consideration, we have the common legend as above quoted, we have also Fa-Hian's testimony. As to what existed fourteen hundred and fifty years ago, he seems to speak of Kya Che as a law-giver of his own sect (Buddhist), and does not lead us to suppose Gaya to have been in other hands than those of Buddhists.—"Kya Che" seems more to resemble the word "Keechuc" or demon than any other. I should be inclined to think that allusion is to a story having a common origin with both sects—Brahminists and Buddhists, who in all probability, only differed (in early times) in points of doctrine and sacrificial practice. Orthodox Hindoos only acknowledge a very small space at Gaya to be sacred for them, which is alluded to in the Purans and in the Mahabharat—this information obtained from a learned Pandit, from the outskirts of Calcutta, who told me, that not more than two or three of the forty-five spots, at which most pilgrims offer the funeral cake, i. e. perform the "pind," are proper, the rest belonging to the Buddhists and Jains ; for instance, the hill called Burrum Jooeen, before described, is properly Bruhm Jain. The very one, we may suppose, Fa-Hian to be describing, on the top is a

* There is no doubt upon this point.—EDS.

modern temple, near to it are two masses of rock, between which some pilgrims and others force themselves, believing that none but true born can accomplish the feat, in other words, those who fail are considered bastards.

With regard to the custom mentioned of people using the earth where "Kya Che" washed his hands, as a remedy for head-ache, &c. the practice still exists at the banks of a tank under the hill called Rookhmoon and close to the Akhayah But tree, where the final "pind" ceremony is performed—but to return to Fa-Hian.

"In this hill also to the west, is the abode of the Arhans; the clergy of Reason, (a sect) come from all kingdoms of those parts to worship Kya Che; those who come with their minds embarrassed, see during the night time, the Arhans coming to discourse with them, and to solve their difficulties, which having done they disappear again forthwith: the forest which covers this hill is very thick; it abounds with lions, tigers, and wolves, so that one cannot travel there but with fear."

With regard to there having been habitations on the hill, to the westward, there are ample traces both to the west and to the north and east, that they were covered with jungle even as late as when we took the country, and swarmed with wild animals of prey are facts well known, though there is scarce a stump of a shrub to be seen now nor on any of the hills within twenty miles, owing to the great demand for fuel; there are still leopards, wolves and hyenas, and occasionally a tiger has been seen; but the lion is an animal unknown in these regions, except by name as a cognizance of the gods.

It will have been remarked that Fa-Hian talks of a peculiar sect as possessing the hill. I have already mentioned, that it is supposed to have been a place of Jain worship, may not then the Jains have been in existence at that period as distinct from the Budhists? at any rate the fact of different sects existing in the fourth century of our era, is hereby established. I have now concluded the pilgrim's journal as far as it relates to the Buddhist localities of zillahs Behar and Patna. I have tried to follow him as closely as possible, and I trust I have done so successfully. I could have wished to have been able to examine several spots around Gaya, particularly the Morah Tal hills, but this could not be effected. With the other places I am familiar enough, though I could still, no doubt, glean much more instructive matter if I

had the opportunity ; but nothing short of excavating the mounds or tumuli (an expensive operation) would with any probability of success lead to satisfactory results.

I must once more remark on the silence of Fa-Hian regarding the places which we might suppose to have belonged to sects, perhaps anti-Buddhist, he must have travelled past, such as Kundilpoor (Burgoun) Barabur and its ancient caves—which, in Sakya's time, must have been used by his followers, the inscriptions themselves point to their having been excavated for Buddhist ascetics at a very early period.

Inferences.

From the foregoing we draw several useful inferences as regards this country, at the close of the fourth century for instance, that a belief existed of four previous Buddhas, a point I believe to have been disputed ; secondly, that several of the great events of Sakya's life, both probable and improbable, were believed in at that early period of our era ; thirdly, that up to the same time Buddhism was flourishing and its votaries unmolested ; fourthly, that holy places now claimed by the Hindoos and Jains, were in those days considered as sacred to Buddhism. These are the leading points, no doubt that a careful examination of the whole narrative would lead to a clearer view than has hitherto been had of the state of India at the commencement of the Christian era. We must however, be constantly at a loss in tracing places from the curious orthography of the Chinese language,—the same remark is applicable to the Tibetan and Burmese volumes, and this is a sad obstacle. I would fain hope, that some of our brethren in China may interest themselves in the search for works in that language concerning India, and in preparing fair translations, which can alone be done by persons on the spot ; and it is further to be hoped, that those who form the forthcoming mission to Tibet, will not lose the opportunity of searching for ancient Sanscrit works in the monasteries of that country, works known to exist and which had Mr. Csoma Korosi been spared to us, we should ere this have possessed in original or by copy ; but this is a digression which my readers must pardon, and I herewith take leave of the subject.

*Some Account of the Town and Palace of Feerozabad, in the vicinity of Dehli, with Introductory Remarks on the sites of other Towns. By HENRY COPE, Secretary Archæological Society of Dehli, and HENRY LEWIS, Deputy Commissary of Ordnance and Member of the Society.**

In no country of the world, or at least in no country with whose history we are sufficiently acquainted to pronounce authoritatively, are there so many monuments of the inordinate vanity of a race of foreign conquerors as in India;† and in no part of this vast empire has that vanity been more pre-eminently displayed than in the immediate vicinity of the modern town of Shahjehanabad, the last, and probably, the greatest specimen of the vain-glorious spirit of its founder, certainly that to which has been secured a more lengthened existence than was enjoyed by any of the towns and citadels that went before. These were at times the capitals of nearly all India, at others merely the chief cities of a territory smaller than many zumeendarees of the present day, yet all are spoken of by the host of historians who have written about them, as the glory and pride of the land; the centre of civilization, and in turn the scenes of the most mighty revolutions which have befallen the mightiest empire in the world. At one time we have the Prince in power, or the founder of a new dynasty, seeking the highest available hill (as in the case of Prithu Raj's palace and Toglukabad) whereon to erect his castle, if not his town, as the site best suited for defence; at another selecting the plains at the foot of those hills, (as Jehanpunnah, and old Dehli,) or the banks of the River Jumna, (as an Kelokheree, Mobarikabad and Feerozabad,) on which to locate himself on account may be of their superior advantages in regard to the vast amount of supplies required for such an immense population; but almost every one of them was actuated by the same all-predominant feeling of pride, all seemed anxious to hand their names down to posterity as the founders of new cities, while some

* Read before the Archæological Society of Dehli, at their meeting of the 9th August, and communicated by that Society.

† The British are specially excluded from this remark, were they to leave India at the present moment, they would leave every little behind them of an architectural character that would stand the ravages of thirty years.—H. C.—H. L.

were swayed by some momentary whim engendered by local circumstances, of which few records are in existence.

In some of these towns and forts were displayed all the architectural beauties that time, which unlimited resources, and the particular taste of each sovereign allowed of his indulging in ; and the most expensive materials were brought from a great distance at a vast cost, to give them the most gorgeous appearance ; while other structures were raised in the most massive, but at the same time, rude style, the result probably of the pressing necessities of the times, especially the frequent and distant wars in which most of the sovereigns of Dehli were continually engaged, and which left them little time for the cultivation of the arts of peace. In these were used the coarse materials on the spot, and the monuments of the glory of former kings were frequently destroyed to save the trouble of quarrying new stone. For in this manner alone can we account for the comparatively few remnants we find at the present day of the massive battlements that must have surrounded several at least of the towns of Delhi in succession, or of the huge piles of buildings that must have been reared within their walls.*

There are nevertheless numerous historical proofs, supported, notwithstanding the extensive devastation to be traced in many directions, by local evidence of the most convincing character, that the several towns, built from time to time, in the neighbourhood of the present Delhi, cannot have been less than thirteen, while tradition, which may, on investigation, turn out partially correct, adds some three or four more to the number. Of the extreme desirableness, in an archæological point of view of fixing the locality of these several towns and forts, and of the value attaching, in a historical point, to researches, which shall identify these localities, with the names that occur in the records of the times, there can, it is presumed, be very little doubt. The historians of the Indo-Mahometan middle ages have placed many of those names on record. They have, in several instances, described the relative positions

* Serec, Jehanpunnah and Old Dehli, must, at the time of the invasion of Taimoor, have occupied a space at least seven miles in length, by some three or four in breadth. The three towns had thirty gates opening to the country or into one another. We hope some day to give an accurate outline of these cities. It is not to be wondered that Saind Moobarik found it necessary to build another town soon after Taimoor's invasion ; he must have left Old Dehli almost a heap of ruins,—H. C.—H. L.

of the various capitals of the Indian empire, that have flourished, under the several names imposed upon them by the caprice or vanity of their founders, and a short review of these records may not be out of place in this paper, introductory, as it is hoped it may prove, to further researches on this interesting subject. All allusion to traditional evidence is omitted. We find it recorded that Kootub-ood-deen Eibuk the first permanent Mahomedan conqueror, and his almost immediate successor, Shums-ood-deen Altumsh or Altumish, both inhabited the fort which the first of them wrested from Rajah Peethowra or Peerthee Raj (from 1191-1236); we find that Gheias-ood-deen Bulbun (1266-1286) erected another fort and built another town "in which were magnificent buildings;" amongst them the celebrated "Ruby" or "Red Palace;" this town will prove, in all probability, to have been the one so long designated in after ages, and when new cities had sprung up, as "Old Dehli," and the site of this place may perhaps be traced through the existence at this day of the village of Gheiaspoor, near Hoomaioon's tomb and the Deenpunnah fort. We find that Kaikobad, his grandson, (1286-88) fitted up a Palace at Kelokheree (Gunglookheree, according to the Ayeen Akhberee) the site of which is clearly indicated by a remark in that work to the effect that Hoomaioon's tomb was within its limits, and this indication is confirmed by the existence of a place of that name, a little beyond Gheiaspoor. The palace built by Kaikobad was then so close to the river that his body was thrown out of one of the windows into the stream.* We find that his successor, Julal-ood-deen Feroz (1288-95), having no confidence in the loyalty of the people of Dehli (the Delhi of Gheias-ood-deen Bulbun?) continued to reside at Kelokheree; this he strengthened with fortifications, and beautified with five gardens, and terraced walks by the side of the river. It is said that the owners followed their king's example, and built houses around his palace, so that Kelokheree became known as the new city (of Delhi), and that Julal-ood-deen having been induced, by the conduct of the neighbouring citizens his subjects, to place greater confidence in them, went on an appointed day to "old Dehli," where he

* The Jumna has taken a considerable turn eastward since then. There is pretty conclusive evidence that, at one time, the main stream flowed by Feerozabad, Deenpunnah, Kelokheree and Mobarikabad, forming doubtless, on account of the huge bund inland or westward, a very fine and attractive sheet of water.—H. C.—H. L.

ascended the throne in *the* Palace; refusing at the same time to take possession of the "Ruby Palace," on the ground that it was the private property of the family of Gheias-ood-deen Bulbun. He returned to Kelokheree in the evening of the *same day*, so that "old Dehli," and Kelokheree must have been very near each other, another presumptive proof in favor of Gheiaspoor of the present day being "old Dehli."* We find that on the murder of Jellal-ood-deen at Manikpoor, by his nephew, the famous Allah-ood-deen Ghilzaie, the widow of the former proclaimed her young son king, and, accompanying him from Kelokheree to Dehli, that is from the then new, to the old city, seated him on the throne in the "Green Palace," so that there were at that time no less than three royal Residences in the same town:—one *the* Palace (in which Jellal-ood-deen ascended the throne, and which may have been the "White Palace" mentioned in the reign of Moez-ood-deen Barram), the "Ruby Palace," so often alluded to, and the "Green Palace." Allah-ood-deen, on the flight of his young cousin, entered Dehli in triumph, and ascended the throne in the "Ruby Palace," (1296-1316.) We find it mentioned in the Ayeen Akhberee, though the fact is singularly enough not even alluded to in Ferishta, that this Allah-ood-deen built the town and fort of "Secree," and the site of this place is most clearly fixed by the record in a subsequent part of Ferishta, that the tomb of Kootub-ood-deen Bukhtear Kakee (the saint to whom pilgrimages are still made at the Kootub village, so well known for its splendid Kootubmeenar) was situate in the fort of Secree. Another collateral proof of this location is that the tomb of Allah-ood-deen is still in partial existence near the Meenar. It is recorded of Allah-ood-deen, that Palaces, Mosques, Universities, Baths, Mausolea, forts and all kinds of public and private buildings sprang up, during his reign, as if by magic. After Secree follow Toglukabad (1322) Mahomedabad, (1325-1351,) Adilabad, and Feerozabad (1354) all pretty well known and of which last, more hereafter. Ten years after the death of the founder of Feerozabad occurred the invasion of Taimoor (1398) of which we have ample records in that king's own institutes and in the work of Shereefood-deen, Alee-Yazdu who singularly enough, gives details regarding the then state of Dehli, which are not to be found

* The "old Delhi" here and elsewhere alluded to, must not be confounded with the town now so called, which will prove to have been founded by Sher Shah.—H. C.—H. L.

in any other work, and the details which he gives respecting Secree, Jehanpunnah, the Houz-khan, and old Dehli will be most valuable in hereafter identifying the ground on which these several places were situate. After this we leave Mubareekabad, built by the second Saiud, in 1436, on the banks of the Jumna, the site of which must have been most likely, either below Kelokheree, or above Ferozabad. We find that Hoomaioon, *built* (1533) according to Abul Fazl, (but *repaired* would probably be the more correct expression, as this will probably be found to have been the fort of "old Dehli" or "Gheiaspoor") the fort of Indraput, which he called "Deenpunnah," that on his expulsion by Sher Shah (Abul Fazl calls him merely Sher Khan, looking upon him in the light of an usurper,) that sovereign destroyed Secree, the town and fort built by Allah-ood-deen, and laid the foundations of another town (1542-1545); this the author of the Ayeen Akhberee tells us, was for the most part in ruins in his time, and will probably turn out to be the town, of which the two extreme gates (N. and S. nearly) are still in existence one (the Kabulee) near the Dehli gate of Shahjehanabad, and the other a very splendid edifice (the Muthra gate) near the western wall of Deenpunnah. The fact of this town having so soon gone to decay may be easily accounted for by the fact of Akhber having transferred the seat of Government to Agra; while the absence, at Agra and elsewhere, during some twenty years, of Sekunder Lodie, and his short-lived successors, immediately before Baber's arrival in India, may have rendered it imperative on Hoomaioon, to provide a suitable place of residence on his coming to the throne.*

It has been observed above, and will be gathered from the details which follow, that much is to be gleaned from some of the historical records of the time, and no doubt more accurate information will be obtained, by a careful examination of the many authors, who are as yet but little known, at our disposal; but in consequence of some of the writers of these records being personally unacquainted with the places they named, while the original works of others have had the serious misfortune of falling into the hands of copyists, on whom alone we have now to depend, and who themselves rarely knew any thing of the neighbourhood

* The utility of this sketch was suggested by the perusal of an admirable letter from Mr. H. M. Elliot, Secretary to Government to the Secretary Archæological Society, in which many of these points are touched upon.

of Dehli. Considerable confusion has thus naturally arisen, and it has become a matter of great difficulty to identify many names and places, which nothing but a careful local investigation can overcome. Translators again,* frequently affording the only means of obtaining information, have contributed considerably to increase the existing confusion, by attributing little or no importance to the accurate details in their original; they probably looked on these details as of mere local interest, and consequently slurred them over carelessly, or omitted them altogether in a very culpable manner, while the wretched orthography, adopted by some of those who have been otherwise more careful, has so entirely obscured the original and proper nomenclature, as to render it almost a matter of impossibility to recognize, in the translations, names of places and persons which, would be familiar under the original, very different, and perfectly, intelligible garb.

We find even Bishop Heber, generally a better informed traveller, and more careful investigator, than many of those who preceded him, and than more who came after him, writing as follows of some of the remains he saw, and how grievously he was misinformed on this particular point will be seen by all; that he was so in several other instances, will be shown hereafter.

By means, however, of local researches of the nature previously alluded to, continued perseveringly, and with an unity of purpose that will, it is to be hoped, characterize the proceedings of our Society, we shall be enabled, in time, to prepare, from the materials in progress, a respectable "Hand Book of Dehli," in which the traveller will be furnished with more authentic accounts, than now exist, or at least are generally accessible, of the various buildings and ruins about Dehli, and which it may be desirable for him to examine if more than a mere sight-seer, so as to understand something at least of the former state of this country, and not have to wander through the mazy mass of ancient remains in almost utter ignorance of the date of their erections, the object with which they were built, the name of the founder, and the date and occasion of their destruction or decay, gazing upon them, in fact, with the undefined feelings of a child looking down into a dark passage, totally ignorant of its extent.

"In our way, one mass of ruins, larger than the rest, was pointed out

* Col. Briggs is a brilliant exception.

to us as *the** old Patan Palace. It has been a large and solid fortress, in a plain and unornamented style of architecture, and would have been picturesque, had it been in a country, where trees grow, and ivy was green,† but is here only ugly and melancholy. It is chiefly remarkable for a high *black* pillar of *cast metal*, called Feeroz Shah's walking stick. This was originally a Hindoo work, the *emblem*, I apprehend, of *Siva*, which stood in a temple on the same spot, and concerning which there was a tradition, like that attached to the coronation stone of the Scots, that while it stood the children of Brámá were to rule Irdraput.‡ On the conquest of the country by the Mussulmans, the vanity of the prediction was shown, and Feeroz, enclosed it *within the Court* of his palace as a trophy of the victory of Islam, over idolatry. It is covered with inscriptions, *mostly Persian and Arabic*, but that which is evidently the original, and probably contains the prophecy, is in a character now obsolete, and unknown, though apparently akin to the Nagaree.”

Were the works of other travellers, before and after Heber, carefully examined, it is probable, we might find as great, if not greater, misrepresentations, and what is worse they indicated considerable amount of ignorance on the part of those living on the spot, who “pointed out” the ruins, and must have told the Bishop, what he has related above, for a personal inspection would have proved to him at least that the pillar was not an *iron* one, and that there were no Persian or Arabic characters upon it. It is particularly to be noted that such works as that of Bishop Heber are likely, on account of the apparent character for research they have obtained, to perpetuate the mistakes they make, as compilers of gazetteers and works on geography, mainly depend on books of travels for the information they condense. Hamilton, in his article “Dehli,” has clearly *taken* much from Heber, though his source of information is not acknowledged.

Circumstances, which it is unnecessary to explain, have precluded the following out the more desirable plan of commencing a series of

* The italics are ours.—H. C.—H. L.

† Had Bishop Heber seen the splendid ruins at the Kootub during the rainy season he would never have made this remark.—H. C.—H. L.

‡ The tradition attaching to the iron pillar at the Kootub, altered and misapplied.—H. C. and H. L.

investigations, for fixing the exact or proximate sites of the successive towns and forts around Dehli, with the precision that has become now more than ever desirable, because the ruins are rapidly passing away, and may soon not leave a vestige behind of that most important period, where historical light begins to illumine the dimness of tradition, and we are, therefore, compelled to defer the examination of the more ancient, and as it happens, more distant remains around us, and to enter, in the first instance, on an investigation of those which, being nearer at hand, have been more easily accessible, since the formation of Archæological Society of Dehli, to whom these researches more especially appertain.

We have already enumerated, in a previous paper (vide Journal of the Asiatic Society, vol. XVI. page 577, June No. for 1847,) the great works that a long and, comparatively, peaceful reign enabled Feeroz Toghluk (or Kootloog as the name ought properly to be written) to erect as monuments of his power, of his munificence, and above all, of his great public spirit. Amongst them are mentioned *two hundred* towns and twenty palaces; a number showing pretty clearly that, although the general spirit of vanity that seems to have actuated many of his predecessors, and some of his successors, was not altogether dormant in this monarch, the desire of doing good to his people predominated greatly over that of securing to himself handsome dwellings and posthumous fame. He preferred affording security to his subjects within the walls of the towns he built for them himself, or which the prevalence of peace enabled others to build under his auspices, to gratifying his love of display in edifices appropriated to his own particular use; and he thereby justified, in a peculiar manner, that celebrated record of his deeds inscribed by himself on the *great Musjeed of Dehli*, possibly the one which Taimoor, is said to have admired so much as to have induced him to carry away all the masons of Dehli, to erect a similar one at Samarkand on his return to his own capital.*

* The exact locality of this Musjeed is a most desirable point of investigation. It is said that when Taimoor invaded India (1398) the musjeed at the Kootub was nearly, if not quite, perfect. If so it must have been *the* great musjeed, and by far the most magnificent edifice in the place: but it was not built by Feeroz whose architecture was very inferior, and it is much more likely he would select one of his own construction, on which to inscribe the record of his undoubted greatness as a liberal, munificent and mild ruler. How interesting too would be, a detailed life of this monarch, for which there

Of these two hundred towns many of which, in all probability, still exist in various parts of the country, under the several denominations of Feerozabad, Feerozpoor, Feerozghur (and possibly Feerozshuhur or Feerozshah, the name of which is immortalized by the contest on the memorable 31st of December, 1845), probably the largest, and certainly the one deserving the greatest consideration, from the Archæologist, is the town of Feerozabad, of which some remains are still in existence close outside the Dehli and Toorkman gates of the modern city: and of the reputed twenty Palaces are first, the celebrated one of which the vast ruins are still visible on the banks of the former stream of the Jumna, immediately south of the extreme point of the present town-wall, and commonly known by the name of Feeroz Shah-ka-Kotlah; and secondly, the Palace of Jehannamah, of which there are few remnants, one of them, however, most prominent, in existence on the hill N. W. of the town of Dehli, on the site of which Mr. W. Fraser, the murdered Agent and Commissioner, built a house that now belongs to

are ample materials, with illustrations of the almost innumerable works of utility he constructed not only in and around Dehli, but in every part of his extensive dominions. In the vicinity of Dehli alone there are said to be, and close investigation would probably add to the number, 25 bunds, some of them in a state of excellent preservation, which owe their existence to this benefactor of his people, and which must have made the cultivation of the land independent of well irrigation, and have removed all fear as to the cold weather crops.—H. C. and H. L.

Since the above was written we have been favoured with the following interesting note from Major E. M. Loftie, a distinguished orientalist, and member of our Society.

“It may, perhaps, be as well to mention, with reference to the supposition, regarding the *great musjid*, on which Fírúz Sháh inscribed a copy of his auto-biography and institutes, that the mosque in question was that built by him in Firuzabad—as will be found stated by Briggs, vol. 1. p. 462, who says, ‘He caused his regulations to be carved on the musjid of Feerozabad.’ The original of Firishta is very clear on this point, his words being ‘burgoombus i alee kidur *musjidi jamia* i Feerozabad bina nihadu, o moo-summun ust’ ‘on the lofty dome (or tower) which he had constructed in the *great mosque* of Firuzabad and which is an octagon.’ Nizamuddin Ahmad, the author of the *Tabakát Akbarí*, also confirms this. He says, in almost the same words,—‘bur goombuz, alee ki din *musjid* i Feerozabad bina nihadee o moosummun ust,’ ‘on the lofty dome (or tower) which he had constructed in the *mosque* of Firuzabad, and which is an octagon.’ From this tower or dome having had eight faces—and the work having been divided into eight books (which latter fact both Firishta and the *Tabakát* mention) we may with considerable probability, conclude that one boyk was inscribed on each face.—What a pity so truly interesting a building should have been destroyed! Are there no hopes of our being able to obtain a fragment even of these inscriptions?”

Maharaja Hindoo Rao. Towards identifying these two localities, (to the first of which, however, we must confine our present observations, leaving the account of the Jehannamah Palace for a future occasion,) as here laid down,* with the names they bear in contemporary and more recent histories, we have the following evidence.

In the first place it is stated in the Zuffernama of Alee Yezd, an almost contemporary author, whom we have had the good fortune to consult in the original, that Feerozabad was situate opposite the embouchure of the canal brought by Feeroz from the Kalee Nuddee into the Jumna, and that embouchure corresponds exactly with that of the present Doab Canal which is, as near as possible, opposite the present ruins. In the second place it is stated, that Feerozabad was distant three miles from Dehli, and three miles from Jehannamah, which, allowing that the site beyond Gheiaspoor was old Dehli, and that we have correctly identified the site of Jehannamah, corresponds as near as can be, allowing an oriental latitude for distances, with the present position. In the third place we have it recorded that Feeroz Shah brought a branch of his canal to Feerozabad, and there is at the present day a branch, choked up, leading from the main stream into the centre of the site we have fixed upon; and lastly, were any further evidence required, and perhaps the most convincing proof of all, is the fact that the name of Feerozabad is still in existence, and applied to the spot on which the Kotla, &c. are situate. There is no actual village, and the Zumeendars of the lands that bear that name, live in the town of Dehli, but they pay rent under that name, and this circumstance most satisfactorily completes the chain of local evidence. The name is erroneously laid down in the district map of the Sudder Board of Revenue, as Feerozpoor. Let us now proceed to a short historical sketch of the place.

It is rather singular that the only mention made of the town in Ferishta's history of the life of Feeroz Toghluk, (we are in hopes, however, of being able to secure more authentic materials in the history of Zeea-ood-deen Bunu, and the Shums-seeraj-Ufeef Feerozshahee, promised us, and which may be available in our description of the locali-

* With all due deference the high authority, under which the Revenue map of the district of Dehli made its appearance, that of Mr. H. M. Elliot, then Secretary to the Board of Revenue, we think that the position of Jehannamah is erroneously indicated in that map, where it is placed, viz :—half a mile or more to the right of the canal, or nearly on the spot occupied by the new Edgah.—H. C. and H. L.

ties) is that it was built in the year of the Hijra 755, corresponding with the year of our Lord 1354, or in the 3d year of that sovereign's reign, and that it adjoined (comparatively speaking) the city of Dehli, (the old city, the Gheiaspoor above indicated ?) It is probable that up to that time, he occupied one of the Palaces in Dehli-proper, or at least during the periods of his residence at the capital, as it is stated that on the 2d of Rujub, A. H. 752, he entered Dehli, and there ascended the throne, and that his second son Mahomed, who ultimately succeeded him, was born in that town. This solitary allusion to Feerozabad, and the precise date of its foundation therein given, are, however, of material consequence. We have in the Kalán Musjeed, the date of the completion of which has been accurately verified,* an excellent specimen of the architecture of those days, a fact of great importance, as the style of almost every monarch, who had sufficient time to devote to the building of towns or palaces or tombs, is marked in the most striking manner. The materials, the plaster both within the walls and on the outside, the conformation of the domes, the slope of the entrance into the chief apartment, the battlements around the same, the stair cases, the brackets, the eaves, and above all, the massiveness

* Vide Asiatic Journal, as above quoted. We have, since the publication of that description of the Kalán Musjeed, been favoured with the following memorandum regarding the translation of the inscription from that distinguished Orientalist, Mr. H. M. Elliot, in the correctness of which we entirely concur, after a careful examination of the original:—

“Allow me to point out an error into which, I think, you have fallen in your translation of the inscription on the Kalán Musjeed. If on further consideration you and Lieut. Lewis concur with me, you should keep a record of it, as it will be useful, perhaps, on reading other monuments of that period; you have translated “*Mugbool ool Mukhateb*,” ‘exalted with the title.’ Now this conjunction of the two words is not good Arabic, and I look upon it that *Mugbool* is part of Jonah Shah’s name:—‘Junah Shah Mugbool, entitled Khan Jehan.’ The name was very common at that period, and his father’s name also is given by some authors as Mulik Mugbool, and by others as Mulik Kubool. Ferishta, in one part, calls the father Mugbil. At all events there seems enough to show that the son’s name was Mukbool, and should be so read in the inscription. Junah Shah was no doubt the name given by the obsequious father, in compliment to Mahomed Toghluk, whose name was Jonah Shah, after whom Jonpoor was so named by his nephew Feeroz? We may add, as a ‘contribution’ to the biography of Khan Jehan the elder, that he is mentioned in Ferishta as the son of Rookun-ood-deen, of Thanesur; but whether the word Thanesuree means that he and his family were of Thanesur, or that he possessed that place in Jagheer only we cannot say. He is certainly spoken of as one of the most disreputable fellows of the time.—H. C.—H. L.

and general character, correspond so entirely, allowing for the difference of the edifices, one a Palace the other a Mosque, that there can be no mistake in ascribing both edifices to the same era, besides which the several buildings that elsewhere mark the site of Feerozabad, and which will be mentioned hereafter, all bear evident signs of having been erected about the same period as the Kalán Musjeed. Although Feerozabad is not again expressly mentioned by the historian we have quoted during the life of its founder, it is reasonable to suppose, it continued a place of importance during his life and perhaps his place of ordinary residence. On the death of Feeroz in A. H. 790, (A. D. 1388,) Geias-ood-deen Togluk, his grandson (by the favorite and eldest, but deceased, son Jutteh Khan) is particularly stated to have ascended the throne in the Palace of Feerozabad, a fact which would go far to establish the correctness of the inference, that his own and of course favorite town was the usual residence of Feeroz. Gheias-ood-deen was succeeded by a cousin named Aboo-Bukr. This prince was, after a short reign of one year and six months, made prisoner, and superseded by his uncle Nusseer-ood-deen, who first took possession of the Palace of Juhannamah, Aboo Bukr being "in the opposite quarter of the city called Feerozabad" (which supposing him to have been in the Palace of that town would be a correct expression with regard to the relative position of the royal residences of Juhannamá and the Kotla, as Feerozabad appears to have stretched in a N. W. direction towards the former. On the 18th of April 1389, (2d Jumahool-awul 789 A. H.) a battle took place in the very streets of Feerozabad, in which 50,000 men were engaged under Nusseer-ood-deen, a fact that speaks convincingly as to the great extent of ground it must have covered. It may also lead to the inference, that the town was very imperfectly protected by outer walls; if they had been of any great strength or size, some trace of them would surely be visible, but there is not one stone upon the other, west of the Palace, that could be pronounced the debris of a wall likely to have been the town-wall of Feerozabad. Nusseer-ood-deen was defeated with the assistance of Bahádur Kadeer, a Mewatee chief, who seems to have held the scales in which several sovereigns were weighed, and found wanting if he did not side with them. He came to the aid of Aboo Bukr, with a strong re-inforcement. On the following day, the king in possession,

marched out of Feerozabad, and drove Nusseer-ood-deen with great slaughter, quite out of Dehli. Another engagement soon after took place in Dehli, but which part it is difficult to ascertain from the context. After this engagement, Aboo Bukr, hearing of treason in his household, fled to his Mewatee friend, leaving Nusseer-ood-deen, to take quiet possession of "Dehli and its Palace." He shortly after pursued the ex-King into Meerut, there took him prisoner, and confined him in Meerut. It is added that he died there some years after, but we may safely infer, that he obtained a conditional degree of liberty, as tradition ascribes to him, the excavation which divides Meerut, at the present day, into the black and white town. That he died a man of some consideration is evident from his tomb still standing in a state of considerable preservation west of, and close to, the jail at Meerut. Nusseer-ood-deen himself seems, subsequently, to have resided chiefly in the town and fort of Mahomedabad, built by his father's predecessor (his grand uncle) Mahomed Togluk, and died there.

The son of Nusseer-ood-deen reigned only 45 days, and the nobles who had, by this time, become all-powerful, raised the younger son of Nusseer-ood-deen to the throne. His name was Mahmood Togluk, and in the accounts of his disastrous reign, we find more frequent mention of Feerozabad than at any previous period, and we may infer that it was again in his time, a place of almost as great importance as Dehli itself. The head of a faction, formed at the very commencement of the reign of Mahmood, named Saadut Khan, having defeated the king's party headed by Mookurreeb Khan (Vakeel-oos-Sultanut, and Ameer-ool-omra) outside of Dehli, would have besieged him in that place, but the rains having set in, he was unable to keep the field, struck his tents, and marched into Feerozabad. He called in a grand son of Feeroz Togluk, named Noosrut Khan, with the view of setting him up against Mahmood, but some household troops, who had hitherto sided with Saadut Khan, seized this Prince, placed him on an elephant, and having advanced against Saadut Khan, expelled him from the city of Feerozabad.

"The misfortunes of the state," says Ferishta,* "daily increased. The owners of Feerozabad, and some of the provinces, espoused the cause of Noosrut Shah. Those of Dehli, and other places, supported the title of Mahmood Togluk. The government fell into anarchy; civil

* Brigg's Translation.

war raged every where ; and a scene was exhibited unheard of before, of two kings in arms against each other, residing in the same capital. Tartar Khan, the son of Guffur Khan of Guzerat, and Fuz-oolla Bulkhee, entitled Kootlough Khan, joined the prince Noosrut at Feerozabad. Mookurrib Khan and other chiefs espoused the cause of Mahmood Togluk, (in Dehli it is presumed,) while Bahádur Naheer, and Mulloo Yekbal Khan, with a strong body of troops occupied the fort of Secree, and remained neuter, but were prepared to join either party according to circumstances. Affairs remained in this state for three years with astonishing equality ; for if one monarch's party had, at any time, the superiority, the balance was soon restored by the neutral chiefs." Here again we have inferential proof, that although not so large as Dehli, and perhaps not so strongly fortified, Feerozabad, or at least its palace, must have been a place of strength and importance to be able to hold out so long against Mahmood Togluk and his party.

Shortly after the above extract we find the following in Ferishta : "In Dehli, Mulloo Yekbal Khan, having disagreed with Mookurrib Khan, abandoned the cause of Mahmood Togluk, (in Dehli) and sent a message to Noosrut Shah (in Feerozabad) offering to join his party. This proposal was readily accepted ; the parties met and went to the palace of Secree" (so that Bahadur Naheer, the Mewatee, must either have been previously expelled, or have joined this party, which is more probable) "where they swore mutual friendship on the Koran at the tomb of Khwaja Kootab-ood-deen Bukhtear Kakee." (The mention of this fact is most important as it is almost the only allusion, in Ferishta at least, on which to ground a certain inference as to the exact position of Secree.) "A quarrel now took place between Mahmood Togluk and Mookurrib Khan ; and about three days after, another rupture occurred between Mulloo Yekbal Khan, and Noosrut Shah, when the former, regardless of his oath, formed a conspiracy to seize the latter. Noosrut Shah informed of the plot, thought it advisable to quit the palace of Secree, and Mulloo Yekbal Khan, intercepting his followers in his retreat, took all his elephants, treasure and baggage ; while the unfortunate Prince, being in no condition to keep the field, fled to his vizier, Tartar Khan, at Paneeput. Mulloo Yekbal Khan, having obtained possession of Feerozabad, increased his power, and strove to expel the king Mahmood, and his partisan Mookurrib

Khan, from the "old city." At length, by the mediation of some nobles, peace was concluded between the parties; but Mulloo Yekbal Khan, perfidious as he was, and regardless of the sacred oaths of the treaty, attacked Mookurrib Khan in his own house, and slew him. He also seized Mahmood Togluk and deprived him of all but the name of king."

The next mention we have of Feerozabad, is on the occasion of the invasion of Taimoor, which occurred very shortly after the events detailed above. On the 13th January 1398, (5th of Jumjadi-ool-awal A. H. 801,*) this scourge of the human race, after putting to death so large a number of prisoners on the plain beyond (east of) Louse, as must have deluged the land with blood, forced the river without opposition, and encamped "on the plain of Feerozabad." This plain was, in all probability, either the land now occupied by Jaisinghpooora, and further south, towards the tomb of Munsoor Ale Khan (Sufdur Jung) or the spot now occupied by modern Dehli. While Dehli became the prey of the ferocious army which he commanded, Feerozabad seems to have escaped the fury of those madmen, for we learn that on Taimoor finally quitting Dehli after revelling for 15 days in blood, and rapine, he marched three miles to Feerozabad (an important fact for hereafter fixing, with tolerable exactitude the position of "Dehli or old Dehli," and which supports our previous inference, that the Dehli of those times was just beyond Indraput) and having encamped there, offered up his prayers in the large mosque, which is said by the historian to have been on the banks of the Jumna; but for this assertion, we might suppose, it was the Kalán Musjeed which was alluded to.

Ten years after Taimoor's invasion we find Mahmood Togluk, still nominal king, defending himself in Feerozabad successfully against his ultimate successor Saiud Khizr Khan, in consequence of the enemy suffering from a scarcity of forage and grain.

Three years after Khizr Khan returned to the assault, on which occasion Mahmood shut himself up in the old citadel of Secree, while Yekteear Khan, who commanded in Feerozabad, seeing the desperate condition of the king's affairs, joined Khizr Khan, and admitted him into the fort (Feerozabad), notwithstanding which Mahmood made a

* There appears an error of 17 days in the abbreviated translation of the Zuffurnama, by P. dela Croix, but we cannot speak with certainty without a more close investigation. Should this prove to be the case as we suspect it will, or the 13th January 1398, as above, we should read 27th December 1397.—H. C.—H. L.

successful defence of Secree. He died the following year near Kaithul, (Feb. 1412.) An Afghan chief, of the name of Dowlut Khan Lodée, reigned after him nominally for one year and three months, when Khizr Khan, finally succeeded in obtaining possession of the throne,* and in establishing a new dynasty. From this time (1416) or 62 years after it was founded, it is most likely that Feerozabad began to decline. The building of Mobarikabad in 1435, showed that it was no longer thought a suitable residence for kings of another race, and while the construction, in 1533, by Humaioo of a new fort, and the foundation by Shere Shah, almost immediately after, of a new and distinct town, part of which must have been built on a portion of the site of Feerozabad, showed that as a town of any consequence it had almost entirely disappeared, the materials being, as usual, in all probability, carried away to construct more recent edifices. This is the more likely, as Sekunder Lodée had, for some years before his death, made Agra his principal place of residence.

From the foregoing outline of its history, and from the tolerably accurate indications we have of its locality, taking also the style of the remains of the palace, and other buildings into consideration, and bearing in mind that we have the date of the Kalán Musjeed† to bear out what we have advanced, we consider that there can be no hesitation in laying it down as a fact, that the ruins of the Kotla, as they now stand, are the remains of the palace built by Feeroz Toghluk, and that the city of Feerozabad, also built by him, extended a considerable distance to the south-west, but mostly to the north-west of the palace, where there are still numerous debris of old buildings, besides several tombs and mosques, more or less perfect, all bearing the most distinct marks of that period; the Kalán Musjeed being one of them. We shall endeavour, in our next paper, to trace even more exactly the limits of Feerozabad, and to give a short account of the several buildings alluded to, accompanied, if possible, by plans and sketches of the most remarkable of those edifices, with a general plan of the whole supposed site and neighbourhood.

* Khizr Khan though sovereign *de facto*, never openly assumed the title of King, but was contented to rule as the representative of Shahrookh, the son and successor of Taimoor, on whose name the Khoobta was read.—H. C.—H. L.

† It seems likely that this Musjeed was erected by Khan Jehan, Wuzeer with the object of securing the good will of the people of the capital on his contemplated usurpation of the throne of his master, then verging rapidly to a state of mental imbecility.—H. C.—H. L.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR AUGUST, 1847.

The usual monthly meeting of the Asiatic Society was held, on the evening of Wednesday, the 4th of August.

The Right Rev. the LORD BISHOP, in the chair.

The proceedings of the previous meeting having been read, and the accounts and vouchers presented—the following gentlemen were balloted for and duly elected members of the Society.

J. Beckwith, Esq., Calcutta, Wm. Greenway, Esq., Assay Master, Agra, and Capt. J. D. Cunningham, Bhopal.

The names of the following gentlemen were submitted, as candidates, for election at the September meeting.

Dr. Lamb, Surgeon General, proposed by Lieut. Staples, seconded by J. W. Laidlay, Esq.

Gilson R. French, Esq., proposed by Mr. Laidlay, seconded by Dr. O'Shaughnessy.

Wm. McDougal, Esq., proposed by Mr. Laidlay, seconded by Dr. O'Shaughnessy.

Read letters from the Secretary to the Military Board, forwarding copies of the Water-guage Register Report for 1845 and 1846, for the Ganges and Jumna rivers.

From H. M. Elliot, Esq., Secretary to the Government of India, Foreign Department, announcing that a British mission was about to proceed to Thibet and inviting the suggestions of the Society regarding all matters of scientific or literary interest the Society might desire to have investigated by the Commissioners.

A communication on this subject, from the Council of the Society, will be found in the sequel of the evening's proceedings.

From the Rev. Dr. Hæberlin, forwarding 100 copies of his revised edition of his Sanscrit Anthology, regarding which a favorable report was presented at the same time from the Secretary in the Oriental Department.

Referred to Oriental Section for advice as to distribution of the copies.

From Capt. Wm. Munro, communicating his report drawn up at the instance and on the part of the Society, on the timber trees of Bengal.

Referred to the Committee of Papers, and the marked thanks of the meeting presented to Capt. Munro, for his valuable co-operation.

From the Rev. Mr. Wenger, presenting his "Introduction to the Bengálí language" and requesting to be favored with a copy of Westergaard's "*Radices Linguae Sanscritæ.*" Copy voted with the thanks of the Society.

From Lieut. R. Strachey, Almorah, dated 9th July, forwarding an account of the Glaciers of the snowy range about 7 marches from Almorah—and offering to present to the Society a small collection of minerals brought by his brother from Thibet.

Lieut. Strachey's paper has been published in the Journal for August, and his offer of the specimens accepted with thanks.

From Capt. J. D. Cunningham, giving a narrative of his antiquarian researches in the Bhopal district.

From B. H. Hodgson, Esq., of Darjeeling, presenting papers with plates on the Cat-toed sub-plantigrades of the Himalayas, and on a new species of *Plecotus*.

From Dr. McGowan, Ningpo, dated Sept. 1846, presenting a curious work, entitled a Chinese Vocabulary and Dialogues, &c.—by P. Strenenassa Pillay, Chusan, 1846.

Ningpo, Sept. 1, 1846.

To the Secretary of the Asiatic Society of Bengal.

DEAR SIR,—I have the pleasure of forwarding, at the request of the author, the accompanying volume entitled "A Manual for Youth and Students, or Chinese Vocabulary and Dialogues, containing an easy Introduction to the Chinese Language, Ningpo Dialect. Compiled and translated into English by P. Strenenassa Pillay—Chusan, 1846."

The book is a philological curiosity and interesting to the friends of oriental literature, as the product of an Indian mind. During his residence

at Chusan as "Head Conicopolly" to H. M. Commissariat from 1842 to 1846, he succeeded in mastering the colloquial dialect, and at his own expense published his Vocabulary, for the benefit of future students.

As the author was unable to read Chinese, and his knowledge of English being far from perfect, the volume abounds in errors. Nevertheless he deserves praise and encouragement for the literary zeal, which prompted him to execute the work. Each square is denoted to the definition of an English word. The first column from the left attempts to give the English sound in Chinese characters. The second is the English, next comes the Chinese definition, and lastly the sound of the Chinese in Tamil and Teloogoo characters. The book, therefore, is designed for the use of English, Chinese and Indian Students. It may be observed, however, that this attempt, like all others that have been made to imitate English sounds by Chinese characters, is a failure. For example—for "*White hair*" we have "*Wé lih hai 'rh*" "*Spring, Se puh ling*," Lose, *lo ho sze*, Present, *pa lih tsun teh*, Slumber—*se lung pa 'rh*."

Commending S. Pillay to those who would foster native talent.

I remain, dear Sir,

Very truly, your's

D. J. McGOWAN.

From Capt. Scott, Secretary Military Board, presenting a parcel of cotton cloth impregnated with oil, which had undergone spontaneous combustion.

A full account of several experiments made on this very important subject, will appear in an early number of the Journal.

From Capt. Jas. Abbott, Huzaree, forwarding mineralogical specimens and describing the geological features of the district he is now surveying.

From Capt. Alexander Cunningham regarding the *Serica* of the Periplus. Pending a more detailed memoir on this subject, we may mention that Capt. Cunningham differs from Dr. Taylor in his identification of *Serica* with Assam, and considers two points sufficient to prove that *Serica* was the country about Yarkand, Khoten, and Beshbalik at the foot of the Altai. Capt. Cunningham observes, "The first of these is, that the road leading to *Serica* lay over the Komedan mountains, at the Source of the Oxus. This name still existed in A. D. 640, when Hwan Thsang visited India, for he mentions Kiumi-tho on the northern bank of the Oxus, along with *Pho-mi-lo*, or Pamer, and *Po-lu-lo*, or

Bolor. The second point is that the ESSEDONES (*magna gens*, as Ptolemy calls them) derive their name from the gallic word *essedā*, a chariot, or wagon. Now the people of the country around Beshbalik were called by the Chinese *Kiotshang*, or wagoners, from *Kiotshē*, a high-wheeled wagon (quære the origin of *coach*?) These people call themselves Ouigours, who are the *Ουιγούροι* of the time of the emperor Justin, and the *Ιθαγούροι* or *Ηθαγούροι* of Ptolemy; which two readings we may safely change to *Ουιγούροι*, the Ouigours, who,—as their Chinese appellation of *Kiotshang*, wagoners, intimates—were the same as the Essedones. The Sera metropolis must have been Beshbalik, the capital of the Ouigours. The PSITARAS river of Pliny must be simply the SU-TARINI or the river TARINI, that is the united streams of the Kashgar, Yarkand, and Khoten rivers. As an illustration of this view I will only cite the position (to the Southward) of ΑΔΙΣΑΓΑ (read ΑΛΙΣΑΓΑ) which must be Alsaug, or Lassa. The Dabasæ, and the Damasæ mountains must have some connexion possibly with the Larmas, but more probably with the name of Lassa itself—and the river Daona must be the Dihong, a proof that so far back as the time of Ptolemy the river (*Sán-pu*) which flowed past Lassa was the head of the Brahmaputra, or Dihong.”

On the part of the Council of the Society, the Senior Secretary stated that on receipt of Mr. Elliott's letter, announcing the departure of a British mission to Thibet, the Council immediately issued instructions to their Curators and Librarian, and invited the several sections to co-operate with them, in preparing lists of scientific desiderata, which the mission might be enabled to supply. They also appointed Messrs. Hodgson, Campbell and Waugh, all resident at Darjeeling, a corresponding sub-Committee of the Society for this special object.

The Council have much pleasure in stating, that so promptly did the sections and officers of the Society comply with their requisition, that on the tenth day from the receipt of Mr. Elliott's letter, copious documents containing many valuable suggestions were forwarded to the mission, with a set of Ritter and Mahlman's maps. Mr. Frith, a member of the Council, having volunteered to accompany the mission as Naturalist, at his own expense, the Council forwarded his offer, with their cordial support, to the Hon'ble the Deputy Governor, who was pleased to declare his readiness to accept it, but expressed much doubt whether Mr. Frith could then overtake the mission.

A favorable report was received from Mr. Welby Jackson, on the MS Catalogue of Curiosities in the Museum, prepared by the Librarian.

Reports were received from the Curators, in the Geological and Zoological Departments, and the following list of Books received during the previous month was submitted by the Librarian.

Books received for the Meeting of the 4th August, 1847.

PRESENTED.

Le Moniteur des Indes Orientales et Occidentales, Vol. II. part I.—By THE EDITORS.

The Quarterly Journal of the Geological Society, No. 10.—By THE SOCIETY.

The Oriental Christian Spectator for July, 1847.—By THE EDITOR.

The Journal of the Royal Asiatic Society, No. XVII. part 2.—By THE SOCIETY.

Meteorological Register, kept at the Surveyor General's Office, Calcutta, for the Month of July, 1847.—By THE OFFICIATING DEPUTY SURVEYOR GENERAL.

The Oriental Baptist, Nos. 6—8.—By THE EDITOR.

Upadeshaka, (a Bengálí periodical.) Nos. 6—8.—By THE EDITOR.

EXCHANGED.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 202.

The Athenæum, Nos. 1021-2.

PURCHASED.

The Edinburgh Review, Nos. 168-9.

The North British Review, No. XIII.

Histoire Naturelle des Poissons, par M. Le Bon Cuvier, et M. A. Valenciennes, Tome dix-neuvième.

Voyage Dans L'Inde, par Victor Jacquemont, pendant les Années 1828 à 1832, in 4 vols. 4to.

As the meeting was about to separate *Major Marshall* handed in the following notice of a motion which he signified his intention to bring forward at the September meeting.

Notice of Motion for next meeting of Asiatic Society.

Each Section, Committee and sub-Committee of the Society shall be authorized to elect its own Secretary.

G. MARSHALL.

August 4th, 1847.

The above notice having been duly recorded, and thanks voted for all donations to the Library and Museum, the meeting adjourned to Wednesday the 1st of September.

Report of Curator, Zoological Department.

The only donations I have to acknowledge on the occasion of the present meeting, are as follow :—

1. From H. Alexander, Esq. C. S. A very fine and perfect skin of the *Ursus isabellinus*, Horsfield, v. *syriacus*, Hemprich and Ehrenberg. Of several skins received, at various times, of this chiefly trans-Himalayan Bear, the present specimen is the first that could be properly mounted as a stuffed specimen.

2. From R. W. G. Frith, Esq. A full grown specimen of the ‘Tokke’ Lizard of the Tenasserim provinces, *Platydictylus gecko*, (Lin.)

3. From E. Lindstedt, Esq. A large specimen of *Dipsas trigonatus*, Schneider, procured in the neighbourhood.

E. BLYTH.

August 4th, 1847.

Supplementary Report.

The group selected for exhibition this evening is that of the *Bucerotidæ*, or Hornbills, with certain genera allied to them : and I have the pleasure to call attention to a particularly fine series of these remarkable birds. The following are the species now mounted in the Society’s Museum ; which I shall endeavour, as far as appears practicable, to arrange into minor groups.

Firstly, a conspicuous series presents itself of species, amongst which the casque attains its maximum of development ; being in particular well elevated posteriorly, where it rises abruptly from the forehead, and generally protrudes backward over it (instead of rising and gradually sloping forward from the middle of the forehead, as in various other species). The sexes resemble each other, black and white—save in one remarkable exception—being the only colours of the plumage : and the medial portion of the throat (more or less broad) is well clad with feathers.

At the head of this series range two remarkable species, both for size and for the peculiar form of the casque, which is altogether different in the two :

but they resemble, and differ from all the rest, in having a white tail crossed by a black band, occupying its subterminal fourth or fifth; and the first species alone has a white wing-band, and the white of its occiput and neck is strongly tinged with fulvous.

1. *B. cavatus*, Shaw, Vieillot: *B. homrai*, Hodgson, *As. Res.* XVIII, pt. II, 169 *et seq.*, with coloured figure and views of the casque at different ages: probably *B. bicornis*, Lin., in which case its range of distribution would extend to the Philippines. Adult male and female, and skeleton of a female, from Arracan; presented by Capt. Phayre: and large head of an Assamese specimen, that was presented by Dr. McCosh. This great species inhabits the more extensive hill forests of all India, but would seem to be considerably more numerous, and also much easier to procure, along the whole eastern coast of the Bay of Bengal, from the Straits of Malacca northward to Sylhet and Assam. The female is rather smaller than the male, and (as also in *B. rhinoceros* and *B. pica*) may be readily distinguished by having the hindmost portion of the casque pale, instead of black.

2. *B. rhinoceros*, Lin.: and the young, probably *B. niger*, Shaw (nec Vieillot), *B. sylvestris*, Vieillot, and *B. diadematus*, Drapiez. Very fine adult male, and young; presented by the Rev. F. T. Lindstedt: and adult female, presented by the Rev. J. Boaz: all from Malacca. Inhabits the Malayan peninsula and archipelago. The sexual differences are pointed out in XIV, 188.

Next may be introduced the species before referred to, as constituting an exception to the general coloration of the others of this group. Its upper parts are of a dusky greyish-brown, rather than black; the head, neck, and thighs are deep ferruginous; the lower-parts and facial mask (as in *B. cavatus*) are alone black; and the tail is fulvous-white, as are often the exterior wing-feathers, to a greater or less extent (even on the two wings of the same bird): but the casque is broad and flat posteriorly, protruding far backward over the forehead; and the nearest affinity appears to be with *B. cavatus*, of which some authors have even considered it the young.

3. *B. hydrocorax*, Lin.: *B. bicornis*, var., Shaw; *B. cristatus*, Vieillot; *B. platyrhynchus*, Pearson, X, 652. Specimen described in XII, 988. This, with the specimen of *B. panayensis*, was presented with the Macao collection by R. Inglis, Esq., as noticed in V, 249: both species inhabit the Moluccas.

The next three are very closely allied. Colour black, with white abdomen and wing-tips, and all or part of the four outer tail-feathers on each side: the casque high, simple, well projected backward over the forehead, compressed and pointed to the front, where it advances at a more or less acute angle with the ridge of the upper mandible.

4. *B. pica*, Scopoli: *B. malabaricus*, var. B, Latham; *B. monoceros*, and probably *B. violaceus*, Shaw; *Bæga Dunnase*, White, *As. Res.* IV, 119:

described in XII, 993 *et seq.* Casque large, much compressed, with a great black mark occupying the larger portion of its ridge and sides in adults, but never descending upon the upper mandible : the three outer tail-feathers white, and the fourth either partially or completely so. Inhabits the Indian peninsula generally, even to Cuttack. Adult male and female, from Chyebassa ; presented by Capt. Tickell : another adult male, from Goomsoor ; presented by Capt. McPherson : and another old female, with nearly half of the upper mandible broken away, but the casque uninjured ; from Cuttack, presented by Dr. Gurney Turner of Midnapore. The last was shot with its upper mandible thus broken, and the edges of the fracture worn away, as it now appears in the stuffed specimen.

5. *B. albirostris*, Shaw, Vieillot : *B. malabaricus*, Latham ; *B. leucogaster*, nobis, X, 922 (the young) : described in XII, 995. Differs from the last in its inferior size ; in having only the terminal portion of all but its middle tail-feathers white ; and in the casque being much wider (as if inflated), with the black mark greatly reduced, occupying the tip only of its ridge, but invariably extending downward upon the upper mandible. In the female, this black mark is less defined, often occupies as much as half of the ridge of the casque, and extends even to occupy the tip of the upper mandible ; while the cutting edges of both mandibles are also black. This species inhabits Bengal, Nepal, the sub-Himalayan region further west, also Assam, Sylhet, Arracan, and the Tenasserim provinces ; but not Southern India, whence the name first bestowed by Latham is inadmissible. I observed it to be tolerably common in the jungles of the Midnapore district. Six specimens retained : two from Bengal ; two from Arracan, presented by Capts. Phayre and Abbott ; and two from Tenasserim, presented by the Rev. J. Barbe ; also a head with unusually large bill and casque, which may perhaps, however, belong to the following species.

6. *B. intermedius*, nobis : *B. violaceus* of Wagler, apud Lord Arthur Hay, *Madr. Journ.* XIII, 148 : probably *B. malabaricus* of Sumatra, apud Raffles : vide p. 10 ante. Resembles the last, but with the wholly white outer tail-feathers of *B. pica*. Inhabits the Malayan peninsula, where very common about the latitude of Penang, and in Prince of Wales' Island ; but I have never seen it in collections made at Malacca. A young specimen, presented (with a Penang collection) by Dr. A. Campbell of Darjeeling.

The next is nearly allied to the two last, but has no white on the belly and tips of the wings, but only on the terminal third of its four outer tail-feathers on each side : the presumed male, however, has a white superciliary coronal circle, which is represented by obscure silvery-greyish in the other sex. Bill and casque wholly yellowish-white, except at the extreme base of the mandibles and on the hindmost portion of the casque, where the colour is black.

7. *B. malayanus*, Raffles: *B. bicolor*, Eyton; *B. Elliotti*, A. Hay, who describes the young as that of the next species, *Madr. Journ.* XIII, 152: probably *B. albirostris* of Java, apud Horsfield:* females (?) described in XII, 995. Common in the Malayan peninsula. Two females (?), from Malacca; presented by the Rev. F. J. Lindstedt: another, presented by J. Middleton, Esq.

In the following series of species, the casque is often wanting altogether, or merely indicated; and when present is generally very low, and slopes forward with a gradual curve from the middle of the forehead, where its hindmost portion is (more or less completely) concealed by the plumage. The two next alone (of all the species before me) exhibit some tendency in the casque to protrude a little backward, in old and fine specimens only; but even then the bulge is hidden by the feathers of the forehead.

8. *B. nigrirostris*, nobis: adults described as those of the preceding species by Lord Arthur Hay, *Madr. Journ.* XIII, 151. Plumage exactly as in *B. malayanus*, except that the outer tail-feathers are not so deeply white-tipped (viz. $2\frac{1}{2}$ in., instead of $3\frac{1}{2}$ to 4 in.); and the size also is inferior, the wing barely exceeding 11 in., instead of being from 12 to 13 in.: the young further differ in having the white tips to the outer tail-feathers spotted over with black. The bill and casque are black in adults, in the young white: and the form of the casque refers this species to the present series of Hornbills; it being low, thinly compressed towards the front, and abruptly truncate anteriorly; with a longitudinal ridge on each side in old birds, occasioning a broad shallow groove above and another below it. As the beak of Raffles's *malayanus*, when "surmounted by a moderate-sized crest, which sloped gradually in front to the curvature of the bill," is described as "yellowish-white," I conclude that his specimen was a young male of the preceding species, rather than of the present one, which I suspect would show much black on the bill when the casque was so far developed. Both species inhabit the Malayan peninsula: and at present we have only a specimen of the young of *B. nigrirostris*, from Malacca; presented by R. W. G. Frith, Esq.

9. *B. birostris*, Scopoli: *B. ginginianus*, Shaw: *Putteal Dunnase*, White, *As. Res.* IV, 121. Size small: colour grey, with a white abdomen and ill-defined whitish supercilium; the tail-feathers having a black subterminal band, and white tips, the latter less developed on the middle pair; great alars also blackish, with white tips. Throat well clad with feathers. Casque low and compressed, following the curve of the bill, with the extremity of its ridge prolonged acutely forward in old birds. Inhabits India generally, but I have never seen it from the countries eastward (not even from Assam). In the Midnapore jungles, I observed it constantly in pairs; instead of in

* The name *albirostris*, indeed, applies much better to this species.

small flocks like *B. albirostris*, and I believe the members generally of the section with which we commenced. Whether others of the present series live also in pairs is worthy of observation. We have specimens of male, female, and young, from Chyebassa; presented by Capt. Tickell.

The next has no casque, but merely a sharp edge to the upper mandible, which is broad at base with an obtuse angle on each side. In XIII, 394, I remarked its affinity for the African *B. limbatus* and *B. flavirostris* of Ruppell; but have not now the opportunity of consulting that author's publications.

10. *B. gingalensis*, Shaw : *B. bengalensis*, Gray. Size small : colour dusky-grey, paler and tinged with rufous below, especially on the under tail-coverts : a slight whitish supercilium : wing-feathers narrowly edged with pale fulvous : the primaries and all but the middle tail-feathers white-tipped. Bill amber-yellow. Throat feathered along the median line only. Inhabits Malabar and Ceylon. Specimen from Ceylon, presented by Lord Arthur Hay.

The next has a low keel-shaped ridge, sloping off to the front; but is nevertheless somewhat allied to the last. Its throat is naked, or in the young merely shows two single rows of ill developed feathers along the middle.

11. *B. carinatus*, nobis, XV, 187. Size moderate, or that of *B. pica*. Colour green-glossed black, with the basal two-thirds of the tail drab-coloured, the wing-feathers slightly margined paler : head fully crested. Bill black, in the one sex, which seems always to have the abdominal region pale; in the other, yellowish-white, with black along the summit of the casque nearly to the end, and also occupying the basal two-thirds of the lower mandible, and the tomæ of the upper one. A young specimen is quite similar to the adults in plumage, but has no trace of casque, and the bill is nigrescent with a whitish ridge and tip. Inhabits the Malayan peninsula; and the pair set up were procured at Malacca, and presented by the Rev. F. J. Lindstedt : another pair, presented by Mr. E. Lindstedt, is preserved for the Hon'ble Company's museum; and I have seen several others.

That which next follows has but a low slight casque, continued (as usual) along the basal two-thirds of the upper mandible, and then sloping off to the front; but is very remarkable for the great development of the feathers that impend the nostrils, which have stiff hair-like disunited webs, and reach forward beyond the truncated extremity of the casque; the frontal feathers being also moderately long and erect, and the whole, with the lengthened occipital plumes, forming a showy ornament.

12. *B. comatus*, Raffles : *B. lugubris*, Begbie, vide *Ann. Mag. N. H.* 1846 p. 405 : adult male described by Lord Arthur Hay, *Madr. Journ.* XIII, 149 In this species, the males have the finely plumed head, neck, breast, abdomen

tail, and wing-tips, pure white; the remainder black, a little tinged with brown upon the back: whereas the females have the neck, breast, and abdomen, also black. Raffles described the young male only, with "back, wings and tail, of a dark brown; the belly of the same colour, mixed with white; and the wing and tail-feathers all tipped with white at their points." The Society's female has a small black patch on its outermost tail-feather. Size rather large, intermediate to *B. pica* and *B. rhinoceros*, with proportionally long and broad cuneated tail. Colour of the beak and casque dusky, the former laterally whitish towards its base. Throat moderately well feathered. Inhabits the Malayan peninsula and Sumatra. Adult male and female, from Malacca; presented by Mr. E. Lindstedt.

13. *B. exarhætus*, Reinwardt. Size small; the tail but little graduated: throat but partially feathered. Colour wholly black, glossed on the upper-parts with green: the bill and casque pale, with three deep longitudinal channels or furrows. Inhabits the Moluccas. Specimen presented by the Batavian Society.

14. *B. panayensis*, Scopoli. This is an anomalous-looking little species; and the Society's only specimen accords with Sonnerat's figure, assigned by him as that of the female bird, whereas, from analogy, I think it is more likely to represent the male; but it differs from that figure in having the throat as well as the cheeks black, (as in *B. cavatus* and *B. hydrocorax*,) and in the tail being black at the base as well as tip, with a fulvous-white cross band occupying its subterminal fourth. *Au reste*, the crown, neck, and under-parts are fulvescent-white, and the upper-parts brown-black, with slight pale margins to the primaries. Casque simple, smooth, compressed and truncate to the front: the upper mandible transversely indented, and marked alternately with black and yellow; the lower with similar furrows, placed much more obliquely. In the other sex, according to Sonnerat, the head and neck are black. Inhabits the Moluccas. Specimen from the former Macao Museum, presented by R. Inglis, Esq.

In *B. comatus*, if not also in *B. panayensis*, a marked dissimilarity of the sexes is observable; and the same prevails in the three species next in order, which are nearly allied together. These have the throat naked and distensible; with the skin of a bright colour. The first alone has no trace of casque, beyond a slight bulging at the base of its upper mandible.

15. *B. nipalensis*, Hodgson: vide XII, 989. Size very large. The female wholly black, except the tips of the wings and tail, which are white: whereas the male has the head, neck, and under-parts, deep ferruginous, passing to maroon on the abdomen and thighs. Young coloured like the adults. Upper mandible with numerous broad transverse channels, each coloured black along its posterior half or more. This great species inhabits the S. E.

Himalaya, also the hill ranges of Assam, and of Munneepore. I have retained an adult male and female, from Munneepore, presented by Capt. Guthrie : and a young male, presented by B. H. Hodgson, Esq.

The two next, with certain other species, as *B. cassidix* of Celebes and the Moluccas, and *B. ruficollis* of New Guinea, are very closely allied together. They have a peculiar wreathed or plaited casque, flat or a little bulged in some, more inflated in others : and the females are wholly black with a white tail ; the males having the head and neck either uniform rufous (as in *B. ruficollis*), or the occiput and nape, with median line of the crown, are deep maronne, the sides of the head and front of the neck being yellowish-white.

16. *B. pusaran*, Raffles : *B. ruficollis* apud nos, XII, 176 : described in XII, 990. Size of *B. rhinoceros* ; with the base of both mandibles transversely ridged in adults : in the full grown young, these lateral ridges of the beak do not appear till after three or four corrugations are exhibited on the casque, prior to which the bill much resembles that of *B. nipalensis* of corresponding age, except that the bulge in place of the casque is more decided.* Inhabits Sylhet, Arracan, the Tenasserim provinces, the Malayan peninsula, and Sumatra. We have two adult males, from Arracan ; presented by Capt. Phayre : adult female, and young male, from Malacca, presented by E. Lindstedt, Esq. : and an adult male, with unusually flat casque (described in XII, 991) ; presented by J. Middleton, Esq.

17. *B. plicatus*, Latham, Shaw (nec Drapiez, which is *B. ruficapillus*, Vieillot) : *B. obscurus*, Gmelin ; *B. subruficollis*, nobis, XII, 177 : described in XII, 990. Resembles the last, but is smaller, with never any lateral ridges to the mandibles : the gular skin is said to be blue, instead of yellow as in the other. I have only seen it from Arracan and the Tenasserim provinces, in which latter territory it would seem to be very common. We have a male from Arracan, presented by Capt. Phayre ; a Tenasserim male, procured by the late Dr. Helfer ; and a Tenasserim female, presented by the Rev. J. Barbe.

The last upon the list is the most remarkable of all the oriental Hornbills : having a short bill, but little curved, surmounted by a moderately high casque, tolerably broad, and abruptly truncate in front, where it presents a very considerable thickness of massive bone ; the throat, neck, and interscapular region are quite naked ; and the middle tail-feathers are greatly elongated, being twice as long as the rest.

18. *B. galeatus*, Lin. : vide XII, 997. Size of *B. rhinoceros* ; and colour brownish-black, with white belly, wing-tips, and shoulders of wings internally ; tail of a buff or drab-white, each feather having a subterminal black band ; the crested occiput black, with ferruginous on the sides of the head : beak

* For notices of the mode of growth and successive replacement of these wreaths and ridges, vide XII, 990, 992.

and casque coral-red, the front of the casque and terminal half of the mandibles yellowish. Young browner, with a tinge of rufous on the breast; the bill and incipient casque wholly pale yellow. Inhabits the Malayan peninsula and archipelago. Adult and young (now in very bad order); presented by J. Middleton, Esq. These specimens, with the very large *B. cavatus* presented by D. McCosh, a Rhinoceros Hornbill since replaced, and to a less extent our *B. hydrocorax*, were much injured by exposure to the dust and attacks of insects, prior to my taking charge of the museum. Our other specimens of this genus are, without exception, in excellent order.

Genus *Irrisor*, Lesson, vide XIV, 188.

I. erythrorhynchos; *Upupa erythrorhynchos*, Latham. From S. Africa. Specimen presented by Lord A. Hay.

Genus *Upupa*. Lin. (as restricted).

1. *U. epops*, Lin. European Hoopoe. Common in Northern India, Bengal, Arracan, &c.; and occurs rarely in the Nilgherries. Two specimens, from the neighbourhood: another pair (very rufescent), from the Tenasserim provinces; presented by the Rev. J. Barbe: vide XV, 11.*

2. *U. senegalensis* (?), Swainson: *U. minor* apud Jerdon: vide XIV, 189. Common in the peninsula of India. Two specimens, from Goomsoor; presented by Capt. Malcolmson.

3. *U. minor*, Shaw. From S. Africa. Specimen presented by Lord A. Hay.

Of the great genus *Buceros*, we accordingly now possess 44 mounted specimens, pertaining to 18 species. In the Catalogue published in the Journal for 1841, p. 652, only 3 specimens are enumerated, viz. *B. hydrocorax* and *B. panayensis*, from the dispersed Macao museum, and the *B. cavatus* presented by Dr. McCosh: but the following Malayan specimens, presented by J. Middleton, Esq. (late of the Hindu College), were also in the museum when I took charge of the Society's collections, in September of that year,—*B. rhinoceros*, *B. bicolor*, *B. pusaran*, and adult and young of *B. galeatus*. We had thus not a single Indian specimen of this genus, unless the Assamese example of *B. cavatus* be so regarded: and all the large specimens, except *B. pusaran* and *B. bicolor*, were considerably injured by exposure on top of the glass-cases in the (then) bird-room. At present we cannot boast a single African species, and are poor in those inhabiting the more distant countries of the Eastern Archipelago.

The species of Hornbill inhabiting the peninsula of India, are only four in number; and I doubt much whether any additional species occurs in Ceylon. Three of these—*B. pica*, *B. birostris*, and *B. gingalensis*,—are con-

* I have seen no Hoopoes from the Malayan peninsula; nor is this genus mentioned in the Sumatran and Javanese catalogues of Sir Stamford Raffles and Dr. Horsfield.

fined in their distribution to India proper, the second only extending its range to Bengal; while the third has not elsewhere been observed than in Malabar and Ceylon. The great *B. cavatus* is alone common to both sides of the Bay of Bengal; continuing its range southward to Sumatra (where noticed by Raffles), if not further. Along the sub-Himalayan region, in Nepal, Bengal, Assam, Sylhet, Arracan, and the Tenasserim provinces, *B. pica* is replaced by *B. albirostris*: and in the S. E. Himalaya, the range of the great *B. nipalensis* commences, and extends eastward at least to Munneepore. There, most probably, and certainly in the vicinity of Cherra Poonjee, *B. pusaran* occurs, and ranges southward through all the intervening countries to the Malayan peninsula and Sumatra; and in Arracan and Tenasserim there is also the *B. plicatus*. The only species I have seen from the last named territories are *B. cavatus*, *B. albirostris*, *B. pusaran*, and *B. plicatus*. In the Malayan peninsula the species are particularly numerous: besides *B. cavatus* and *B. pusaran*, there are the remarkable *B. galeatus*, the otherwise remarkable *B. rhinoceros*, and *B. intermedius*, *B. bicolor*, *B. malayanus*, *B. carinatus*, and *B. comatus*,—all in the Society's museum; and also, it would seem, the *B. corrugatus*, Tem. (v. *rugosus*, Begbie, described in *Ann. Mag. N. H.* 1846, p. 404.)* With the last named I am unacquainted; nor have I much information respecting the distribution of these birds in the islands.

The most anomalous species of this great genus known to me, are the long-legged *B. abyssinicus* (or *Abba Gumba* of Bruce), upon which M. Lesson founds his ill-constructed hybrid name *Bucorvus*, and the Malayan *B. galeatus*. The only further dismemberments noticed in the second edition of Mr. G. R. Gray's 'List of the Genera of Birds,' are *Toccus*, Lesson, founded on *B. erythrorhynchos*, Brisson, and *Euryceros*, Lesson, founded on a species named *Prevostii* by that naturalist. A good group is however formed by the species with well developed casque, the hindmost portion of which rises high above the coronal feathers; as typified by *B. cavatus*, *B. rhinoceros*, *B. hydrocorax*, and *B. pica*. Another good group consists of those with wreathed casque, naked throat, and dissimilar plumage in the sexes; as typified by *B. cassidix* and *B. ruficollis*: *B. nipalensis* ranging here as an aberrant species. And the rest, while according throughout in having the

* "This species is 2½ ft. long. Body, wings, and tail, black, with the exception of the cheeks, shoulders, and throat, which are dirty white, mixed with cinereous. One-third of the tail from the tip smoky-white; helmet and pouch-like protuberance under the throat crimson, the former furrowed with three deep indentations. Upper mandible yellowish-brown, inclining to white at the tip: the basal half of the lower mandible ochraceous and transversely caniculate; remainder of the mandible dirty white."—Begbie.

casque, when present, low and compressed, with its hindmost portion rising gradually from the forehead and more or less concealed by the feathers, differ so variously in other respects that no two before me can be specially approximated together. Still, an examination of the remaining species of the genus might elucidate their mutual affinities.

For the above reason, with the view of tracing those affinities, our desiderata comprise all species not included in the foregoing list. Of those of India, we have not the young of *B. cavatus*, nor of *B. pica*; nor the young female of *B. nipalensis*: and more specimens of *B. gingalensis* would be acceptable. And of the species inhabiting the Malayan peninsula, we want *B. corrugatus*; the young of *B. comatus* and of *B. bicolor*; and good series of *B. intermedius* and *B. nigristrois*, with males of *B. malayanus*: also, especially, good specimens of *B. galeatus*; and any species procured in the Archipelago.

E. BLYTH.

Addendum to Report on the *Sciuridæ*, p. 864 *et seq.*, *ante*. In a letter just received from Mr. Jerdon, now stationed at Tellicherry, on the Malabar coast, that gentleman remarks—"With regard to the Squirrels, we have, of course, the large one (*purpureus*), sometimes all red, sometimes with a considerable mixture of black; but never nearly all black, and never with tuftless ears. We have also *tristriatus* to the exclusion of *palmarum*, throughout the whole Malabar coast from Cape Comorin, only extending to the forests at the edge of the ghâts above. Throughout all the Carnatic, Mysore, Hyderabad, &c. only *palmarum*. I suspect the *tristriatus* is never found far from forest country. The *trilineatus* occurs, I find, in some of the forests of the ghâts as well as in the Nilgherries."

E. B.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Augt. 1847.

Days of the Month.		Maximum Pressure observed at 9h 50m.					Minimum Pressure observed at 4 p. m.					Rain Gauges.		Moon's phases.																	
IS	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Temperature.		Wind.	Aspect of the Sky.	Maximum Temperature.	Elevation.																			
		Of the Mer.	Of the Air.				Of the Mer.	Of the Air.				Feet	Feet																		
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Mean	
In. 29.528	90.0	89.5	83.0 S.	Cumuli.	In. 29.443	89.0	88.9	82.6 S.	Cloudy.	92.0	..	Upper 40	..	Lower 40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
500 90.0	89.8	83.8 S.	Ditto.	426 88.0	87.2	82.0 S.	Ditto.	429 87.0	86.0	81.0 W.S.W.	93.5	0.08	0.14	0.12	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22	0.13	0.22
532 89.5	89.0	82.1 E.	Cumulo strati.	431 89.0	88.0	81.0 E.	Cumulo.	455 86.0	85.0	82.0 N. E.	91.8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
555 85.8	86.5	82.0 E.	Cloudy.	491 89.0	88.0	80.2 S.	Ditto.	546 82.0	81.8	80.0 S.	93.0	0.36	0.43	0.39	0.26	0.66	0.74	1.76	1.83	0.70	1.10	1.17	0.66	0.75	0.83	0.93	0.83	0.93	0.83	0.93	
575 84.5	84.3	81.0 S.	Ditto.	583 83.6	80.0	78.0 S. E.	Ditto.	573 86.7	85.2	81.9 S.	87.5	1.10	1.17	0.66	0.75	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93
608 90.0	88.0	83.3 S.	Ditto.	635 81.0	81.0	78.4 S.	Rainy.	635 81.0	81.0	78.4 S.	87.5	1.10	1.17	0.66	0.75	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93
657 84.5	83.5	80.0 E.	Ditto.	582 85.4	85.0	81.0 S.	Cloudy.	582 85.4	85.0	81.0 S.	87.5	1.10	1.17	0.66	0.75	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93	0.83	0.93
670 80.5	80.9	78.9 E.	Ditto.	499 87.0	85.0	81.8 N.	Cumulo strati.	499 87.0	85.0	81.8 N.	91.7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
668 87.0	84.1	81.5 E.	Ditto.	435 92.0	91.0	81.8 E.	Ditto.	435 92.0	91.0	81.8 E.	93.4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
707 83.0	83.0	79.5 N. E.	Cloudy.	414 91.0	85.4	81.2 S.	Cumuli.	414 91.0	85.4	81.2 S.	95.0	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25	0.16	0.25
641 87.0	85.0	80.0 W.	Cumulo strati.	446 84.0	83.8	80.9 S. E.	Cloudy.	446 84.0	83.8	80.9 S. E.	90.0	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30	1.26	1.30
573 88.8	88.4	83.0 N. E.	Ditto.	484 84.0	83.8	80.9 S. E.	Rain, thundering.	484 84.0	83.8	80.9 S. E.	84.0	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33	1.24	1.33
505 89.5	88.0	82.7 E.	Cloudy.	477 81.8	82.5	80.7 S.	Cloudy.	477 81.8	82.5	80.7 S.	89.5	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74	2.60	2.74
546 88.0	87.0	80.4 E.	Drizzly.	530 80.0	80.0	79.0 S.	Cloudy.	530 80.0	80.0	79.0 S.	82.9	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87	1.70	1.87
559 79.8	80.0	78.8 E.	Nimbi.	572 83.0	83.0	78.5 S.	Ditto.	572 83.0	83.0	78.5 S.	86.0	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20	0.12	0.20
570 86.0	85.9	82.3 S.	Ditto.	639 87.2	86.1	82.2 S.	Cumuli.	639 87.2	86.1	82.2 S.	87.9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
732 82.0	81.5	78.8 S.	Cumuli.	638 91.4	90.5	81.5 S.	Ditto.	638 91.4	90.5	81.5 S.	93.0	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10	0.04	0.10
755 89.3	88.0	83.0 W.	Ditto.	597 85.0	83.8	79.8 S.	Ditto.	597 85.0	83.8	79.8 S.	93.6	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50	0.44	0.50
709 89.5	88.7	83.0 W.	Ditto.	530 90.0	88.0	83.0 S. E.	Drizzly.	530 90.0	88.0	83.0 S. E.	87.8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
638 90.5	89.8	83.0 N. W.	Cirro strati.	528 85.0	84.8	80.0 S.	Cumulo strati.	528 85.0	84.8	80.0 S.	91.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
629 83.9	83.5	79.8 N. E.	Ditto.	592 88.5	87.0	79.5 S.	Ditto.	592 88.5	87.0	79.5 S.	92.5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
710 89.8	87.0	81.8 S.	Cumulo strati.	552 91.5	90.2	82.0 S.	Ditto.	552 91.5	90.2	82.0 S.	93.6	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21	0.14	0.21
680 90.0	89.2	83.0 S.	Ditto.	584 87.5	86.8	81.6 S.	Ditto.	584 87.5	86.8	81.6 S.	92.5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
680 90.0	88.0	82.5 E.	Ditto.	608 88.7	84.0	80.1 S.	Ditto.	608 88.7	84.0	80.1 S.	93.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
748 90.4	89.0	83.0 E.	Ditto.	587 89.0	87.0	81.0 S.	Ditto.	587 89.0	87.0	81.0 S.	95.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
707 90.5	89.0	80.0 E.	Ditto.	585 93.2	91.1	80.0 S.	Ditto.	585 93.2	91.1	80.0 S.	93.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
692 91.0	89.0	82.0 E.	Ditto.	623 88.5	87.0	81.8 S.	Ditto.	623 88.5	87.0	81.8 S.	93.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
703 90.6	88.4	81.8 N. E.	Cumuli.	29.533	87.0	85.4	Cumuli.	29.533	87.0	85.4	90.6	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09	13.54	15.09

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OCTOBER, 1847.

On the tame Sheep and Goats of the sub-Himālayas and of Tibet.

By B. H. HODGSON, Esq.

Zoologists, seeking to deduce the essential characters of species and genera, very properly give an unlimited preference to wild over domesticated animals, as exemplars of their several kinds. But in an æconomical point of view, the world at large as properly feels a higher interest in the tame species, and particularly in those herds and flocks, which contribute so largely to the food and clothing of mankind. England stands pre-eminent in Europe for the attention paid, not only to the breeding, but to the describing, of her domesticated animals, being fully aware that accurate book lore is always apt to be subservient in various unexpected ways to practical utility. It is, therefore, somewhat surprising, that the widely diffused colonists of England, have not imitated the excellent example of their compatriots at home, and that the herds and flocks by which Britons are surrounded in the colonies of the empire, yet remain almost wholly undescribed.

I trust that this reproach to the colonial residents may ere long be wiped away, and that some of the many enlightened and able men, scattered over the Indian continent, from the snows to Cape Comorin, will be induced to favour the public with descriptions of the numerous breeds of large and small horned cattle, that are to be found in the various provinces of this vast country.

I purpose, on the present occasion, to describe the several breeds of tame Sheep and Goats, proper to my own vicinity ; and hereafter to give

a similar account of the large horned cattle or Bovines, that is, the tame Oxen, Buffaloes and Bisons, reared between the Tarai or skirt of the plains of India, and the trans-Himálayan plains of Tibet.

I shall begin with the sheep, and, in order to mark more distinctly the *essential characters* of each of the two groups to be now reviewed, I shall commence, in regard to each, by setting down those characters in the usual manner of Zoologists.

The tame sheep of the world at large have been supposed to retain so few of the original marks of their race, that it has been thought difficult or impossible to point out their wild progenitors. Perhaps a good deal of this difficulty has arisen from the heretofore imperfect examination of the wild races, and from the manner in which the distinctive characters of the whole of them have been lumped together to constitute a single Genus *Ovis*. In a paper recently presented to the Asiatic Society of Bengal, I have distributed the wild sheep known to me into *three* genera. And to that paper I beg to refer the curious reader, merely observing on the present occasion, that the sheep proper, typed by the wild *Argalis* of Siberia and of Tibet, exhibit the whole of the following characters, which are likewise common to all the several breeds of domesticated sheep now to be described, with the single and but very partial exception of 'horned females,' some of the following tame breeds having females, sometimes void of horns.

Genus *Ovis*.

Sheep-proper.

Horns in both sexes.

No muffle.

Eye pits large, but immoveable.

Feet pits small in all the four feet.

Inguinal glands large, with a copious secretion, but vaguely defined pit or vent.

Calcic glands or tufts, none.*

Teats two.

No odour in the males.

These animals have, for further and subordinate marks, massive angular compressed and heavily wrinkled horns, inserted proximately on the top of the head, and turned sideways almost into a perfect circle,

* For these organs see Journal Asiatic Society, above referred to.

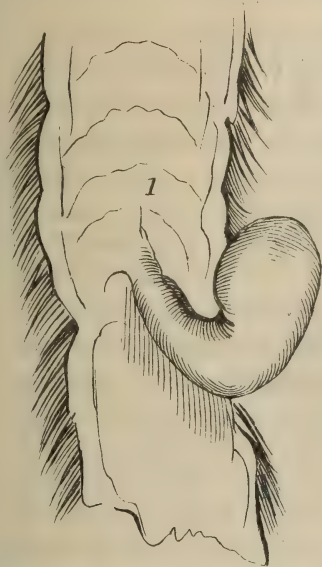
and their flat points again more or less reverted outwards and backwards, sometimes so much as to describe a second circular curve, whereby the twist becomes spirate : also, short deer-like tails ; and, lastly, no beard nor mane. Requesting the reader to keep these general designatory marks of all true sheep in mind, I now proceed to exhibit in the particular portrait of each tame breed, the special modifications to which these primitive marks are subjected by domestication, as well as the other and more popular traits of each breed.

1. *Ovis húníá*.—The Húníá of western, and Hálúk of eastern, Tibet. This tall and graceful animal is the blackfaced or polycerate sheep of Thibet, the especial breed of that country, and one which is well known to European visitors of the western Himálayas, as the common beast of burden for the transit of the snowy region, being singularly docile and sure-footed. The Húníá is a large species, measuring 4 to $4\frac{1}{2}$ feet in length from the snout to the vent, and $2\frac{1}{2}$ to $2\frac{3}{4}$ feet in height. Head to occiput (straight) 11 to $11\frac{1}{2}$ inches. Tail only, $4\frac{1}{2}$ to $5\frac{1}{2}$ inches. Tail and wool, $6\frac{1}{2}$ to $7\frac{1}{2}$ inches. Ears $4\frac{1}{2}$ to $5\frac{1}{2}$ inches. Girth behind the shoulder 3 feet to $3\frac{1}{4}$ feet. Maximum length of the horns along the curve 18 to 20 inches, and maximum girth at their base 6 to 7 inches. Both sexes have usually horns, and the males are almost never devoid of them, the females, rarely. The horns of the Húníá are distinguished for attenuation and consequent separation at their bases. But these characters are only relative, like those of the comparative smoothness of the horns, and their higher compression as contrasted with the horns of the wild race, as well as of some of the tame ones that will follow. For the rest, the horns of the Húníá exhibit with sufficient distinctness the characters both of form and curvative proper to the wild type, being triangular, compressed, transversely wrinkled, and curving circularly to the sides so as to describe two-thirds of a perfect sphere, when their smooth flat points are again reverted outwards and sometimes backwards, and so much so as to describe a second nearly perfect circle. I have not noticed this tendency to the spiral or corkscrew twist in the wild race. It is only very imperfect in the tame, and such as it is, is the product of advanced age, very probably equally characterising the wild race in old age. The moderate-sized head of the Húníá has great depth, moderate width, and considerable attenuation to the fine oblique muzzle, which shows not the least sign of nudi-

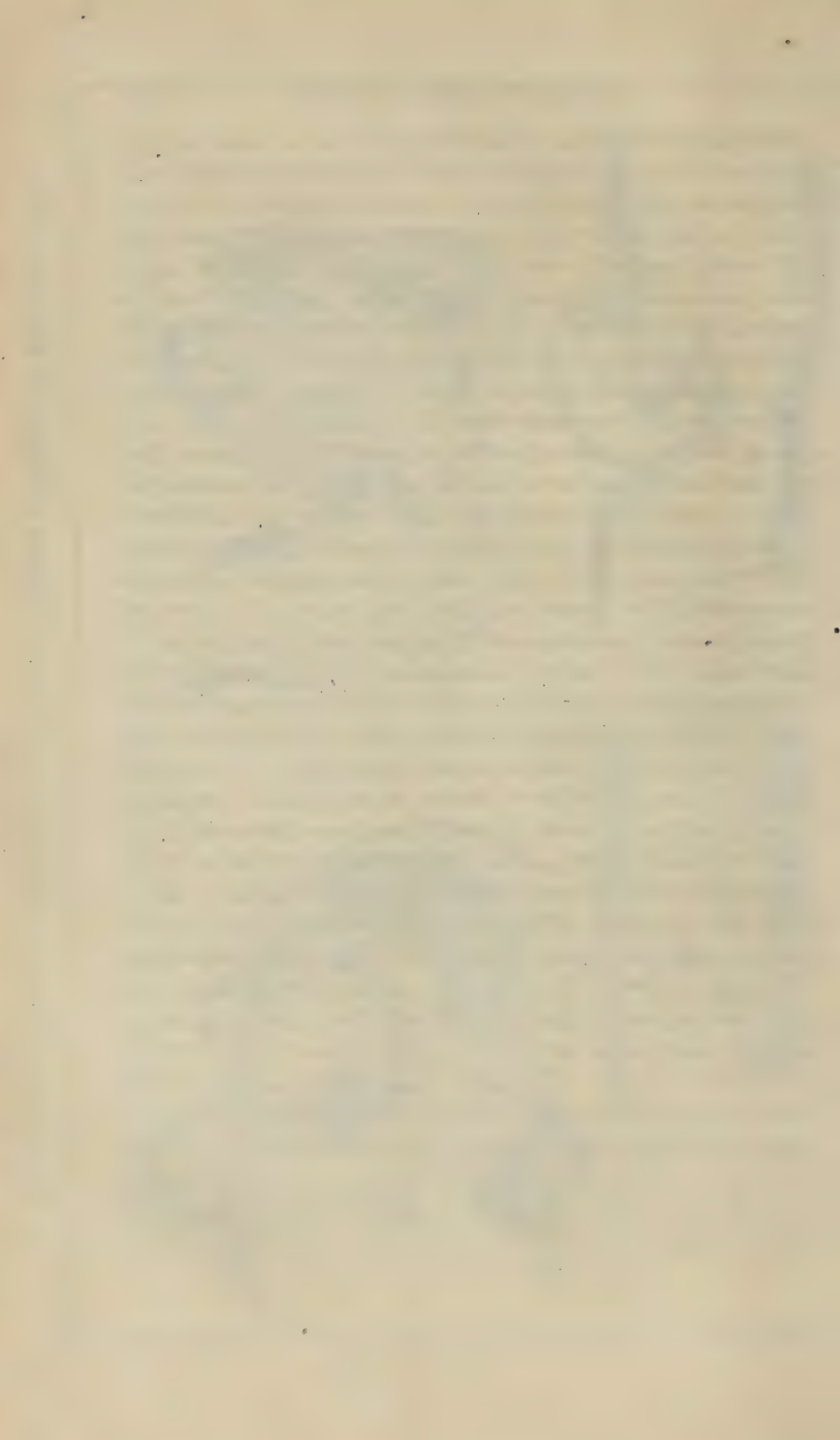
ty or moistness, and has the narrow nostrils curving laterally upwards. The chaffron, or bridge of the nose, is moderately arched or bombed, but more so than in the wild race; and the forehead is less flat and less broad than in the Argalis, being slightly arched both lengthwise and across. The longish narrow and pointed ears differ from those of the wild race, only by being partially or wholly pendent, whereas in the wild race they are erect or horizontal and much more mobile, acting efficiently like moveable funnels to catch every sound, a security denied to the several tame races, which, looking to man for their protection, seem to lose the mobility of the ear, as a consequence of disuse or less frequent and active use of the organ. The eyes, of good size and sufficient prominency of orbit, are seated near to the base of the horns and remote from the muzzle; and beneath them is the eye pit, strongly marked both in the skin and scull, and carrying off a specific secretion, though both the gland and its vent or pore are apt to escape observation, owing to the woolly coverture of the creeks prevailing throughout the eye pits, even in their interior. The neck is rather thin and short. The body moderately full and somewhat elongated. The limbs rather long and fine, hardly less so than in the wild race, and not remarkably rigid or perpendicular, except perhaps by comparison with those deer-like races. The hoofs compressed and high. The false hoofs small and obtuse. The feet pits are common to all four feet, and small only by comparison with those of Deer and Antelopes, large in comparison with those of Goats,* and provided with a distinct gland, yielding a specific secretion which is viscid and aqueous when fresh, candid when dry, and nearly void of odour. Not so the secretion of the groin glands-organs, which in the Húniá are conspicuous, and yield a greasy fetid subaqueous matter, which passes off constantly by a vaguely defined pore, quite similar to that of the axine deer, but less definite in form than in the true Antelopes; of which the Indian Black, or Sásin, offers an excellent and familiar exemplar.

The possession of these organs has been denied to the sheep by most writers. Wherefore I have been more particular in describing them; and may add, that they belong to the two wild and six tame races of these regions without exception; and may, therefore, be considered emphatically normal. Sheep are pre-eminently Alpine animals, and it

* See accompanying sketches.



1. Foot pore of Sheep. 2. Foot pore of Goats. 3. Head of Barwal. 4. of Silingia.



is, therefore, not surprising that the tame and wild breeds of the Himá-layas, mountains which constitute so unrivalled a part of the "dome of the world," should be pre-eminently characteristic; nor that the same regions should, in the wild Nahoors and Barhels, exhibit samples of abnormal sheep; and such I take to be these last named Himálayan species, and likewise the wild sheep of Europe or the Moufflons; whilst the Argalis, both of Asia and of America, constitute the true type of the Ovine family.*

The tail of the Húniá is invariably short, though less remarkably so than in the Argalis, yet still retaining the same essentially deer-like character. It is cylindrico-conic and two-thirds nude below, differing little or not at all from the same organ in the several other tame races of these regions, where long-tailed sheep are never seen till you reach the open plains of India; and, as upon those plains not only are *all* the sheep long tailed, but Dumbas or montrous tailed sheep are common, whilst the latter also are totally unknown in the hills, it is a legitimate inference, that this caudal augmentation in most of its phases is an instance of degeneracy in these pre-eminently Alpine animals, and that, therefore, 'tis vain to look in the wild state for any prototype of at least the more egregious of the macropygean breeds, how great soever be the historical antiquity of the Dumbas.†

Having now described the Húniá from the tip of his nose to the end of his tail, I may conclude with his œconomic qualities, first resuming that this fine breed is characterised by extreme docility, by superior size, gracefulness of form, slender horns, of which there are frequently four, and rarely, even five, a polycerate tendency displayed by no other tame breed of these regions; and, lastly, by the almost invariable mark of a black face. The general colour is almost as invariably white. I never saw a wholly black sheep of this breed. Nor I think one with perfectly white face and legs. Both the latter parts are characteristically and almost invariably dark, black or brown, and there are patches of the same hue, occasionally, on the neck or hips: but rarely.

This genuinely Tibetan race cannot endure the rank pasture or high

* See paper above referred to in Journal Asiatic Society.

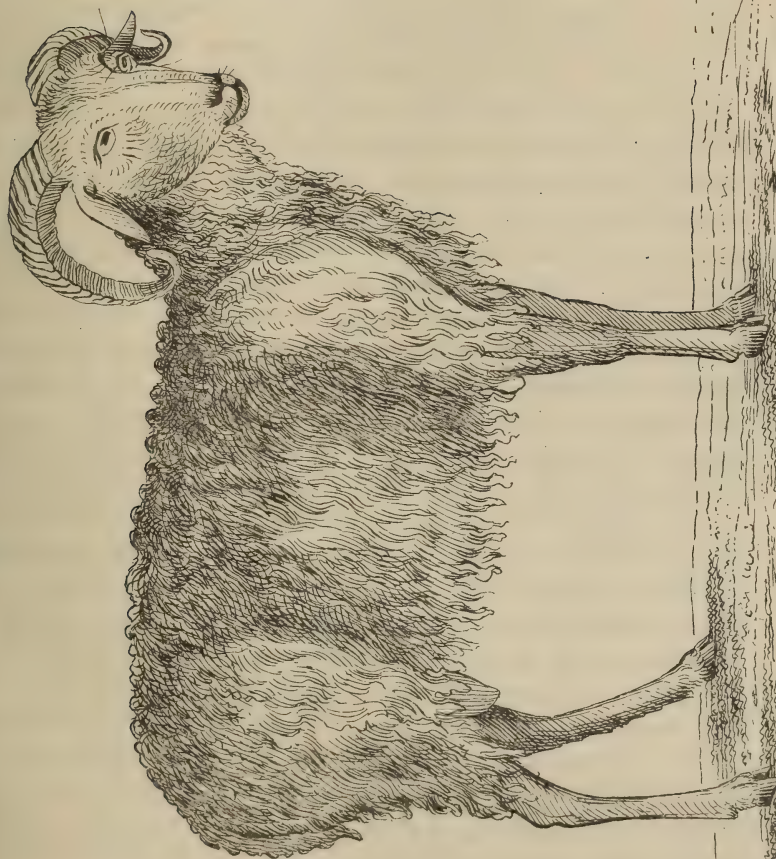
† The range of civil, as compared with physical, history, is as 5000 years to periods, the imagination can hardly cope with, though fossil Zoology gives demonstration of their reality and successive character.

temperature, or both, of the sub-Himálayas south of the Cachar; the Cachar being the juxta-nivean region of these hills, where vegetation and temperature are European and quasi Arctic. But the Húniá does very well in the Cachar, and may with care be bred, or at least fattened, in the central region at heights not under 7 to 8000 feet, where the maximum temperature in the shade is about 70°. It is a hardy animal, feeding freely and fattening kindly. Its mutton and its fleece are both excellent in quality and very abundant in quantity, so that I should suppose the animal well worthy of the attention of sheep-rearers in cold climates. The wool is of the kind called long staple, and is valued by the export at 8 pence per pound.* The Tibetans who dress entirely in woollen, are clothed almost solely from the fleece of the Húniá, an excellent material but unskilfully wrought by them into cloth, blankets, and felts, as well as knitted into long stocking boots.

2. *Ovis silingia*.—The Siling sheep or Pélúk of eastern Tibet and of Siling. Eastern Tibet is the Kham of the natives of that vast plateau and is a part of it less elevated, less rugged and less cold than the central, and yet more so than the western, portion. Towards Assam, in the valley of the Sánpú, rice is grown in Kham or eastern Tibet, a fact decisive of the high temperature of Kham, as compared with Utsang and Nari, or central and western Tibet. Indeed the plateau of Tibet descends rapidly all the way along the course of the Sánpú or Brahmáputra from its source to its gorge or exit from the Himálaya.† But still Kham must be described as a country of very moderate heat as well as of great dryness. North and east of Kham, on the verge of China, and separated from the Chinese provinces of Sifan and Shensi by the Peling mountains is Siling or Tángút, a colder and loftier region like Nari, and comprising the upper course of the Hoangho, as Nári that of the upper Bramhaputra. Siling is a country of great but vague celebrity, the Singapúr of the trade of high Asia, the cradle of the Chinese and Mantchurian families of mankind, and possibly of the

* See Journal of the Agricultural Society, Vol. V. Part IV. p. 205. I shall be happy to facilitate the procuring of the animal or its wool for an experimental Essay.

† Tibet is the vale of the Indus and Sánpú, the watershed being near the holy lakes, where the elevation is nigh 15,000 feet. At its gorge the Indus is not under 10,000. The Sánpú towards its source in Nari is above 15,000: towards its vent in Kham under 7000: in its mid-course through Utsang, a mean nearer the latter.



OVIS SILINGIA. SILING SHEEP OF TIBET.

Tibetan family also, and identical, I believe, with the *Serica regio** of the classics; and, last not least, the natal soil of a fine breed of sheep which spreading thence westerly through Kham (following probably and indicating the migrations in one route of the Scythic stock of the human race) is now common in Tibet as far as Lassa and Digarchi, whence the cis-Himálays have imported a few samples, but rather as curiosities than for œconomic uses. The *Silingia* or sheep of Siling is nearly as common as the *Húniá* in Kham, but less so in Utsang and nearly or quite unknown in Nári, where the *Húniá* most abounds. The *Silingia* is a delicate breed, both in structure and constitution, compared with the *Húniá*, and though it will live and procreate in the Cachar, or northern region of the sub-Himálayas, it is rare there, and unknown south of it. In Nepál I procured my specimens from the Court, which imported them from Lassa: in Sikim from the Barmúkha Raja, who procured them from Kham, all parties extolling highly the unrivalled fineness of the fleece, from which the people of Siling and the Chinese located there, manufacture the *Tús* and *Málidah*, or the finest woollens known to these regions, save such as are the product of European looms. This wool has been examined by competent authority, and is declared to be of shorter staple than that of the *Húniá*, but suitable for combing, and worth in the market about the same price as the *Húniá* fleece or eight pence per pound.† Of the merits of the mutton, I cannot speak from experience. But the Tibetans and Sikimites laud the flesh as highly as they do the fleece. The animal which yields both is somewhat smaller as well as slighter make than the *Húniá*, but bears otherwise much resemblance to it and is possessed, like it, of all the essential characters of the genus, which characters, having been once explained fully, need not be repeated. Length from snout to vent $3\frac{1}{2}$ to $3\frac{3}{4}$ feet. Height 2 to $2\frac{1}{4}$ feet. Head to occiput (straight) $9\frac{1}{2}$ to 10 inches. Ears 4 to $4\frac{1}{2}$. Tail only $4\frac{1}{2}$ to 5. Tail and wool, 6. Girth behind shoulder $2\frac{1}{4}$ to $2\frac{1}{2}$ feet. Horns by the curve $1\frac{1}{2}$ feet. Their

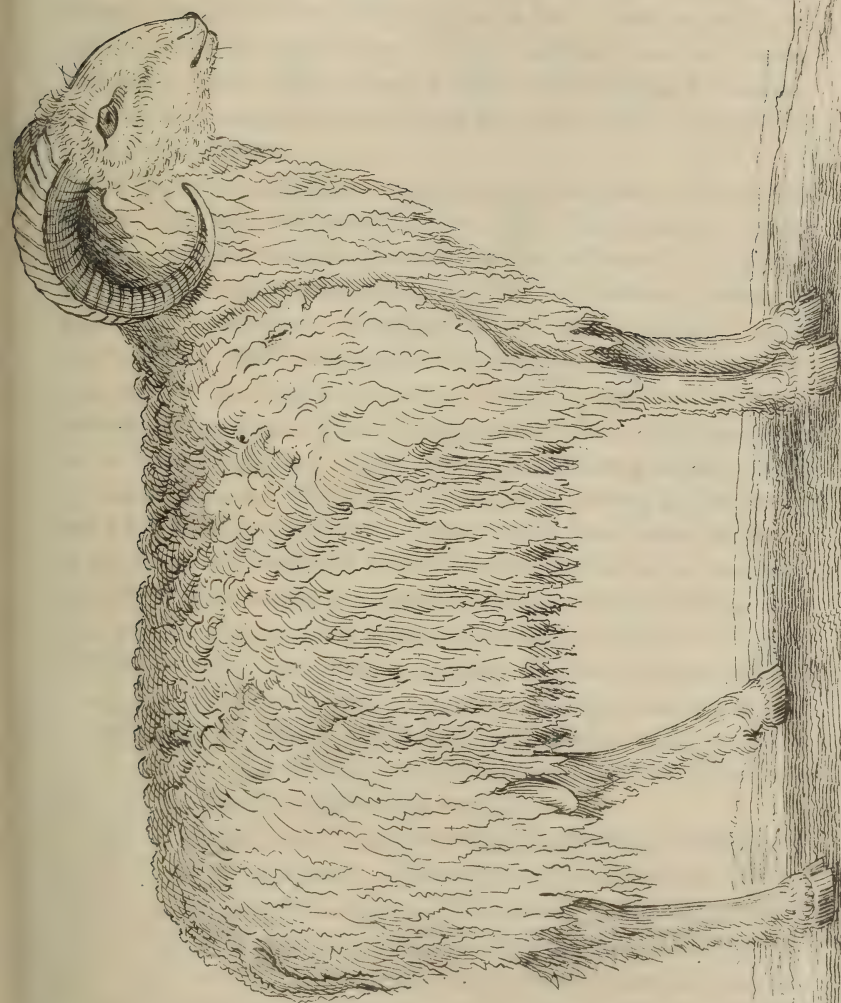
* I have read with pleasure and profit Mr. Taylor's dissertation on the country of the Seres. But I still retain decidedly my former opinion, that the *Serica* or *Sinica regio* is Siling vel Sining vel Siring, inclusive of Kham, a country of great productiveness, greater trade (transit) and ancient and high celebrity, open to China by the Hoangho, to India by the Sápnu, and to western Asia and Europe by *all* the plateau of high Asia.

† See Journal Agri. Society loco citato.

basal girth $6\frac{1}{2}$ to $7\frac{1}{2}$ inches. The Silingia is a breed of medium size and delicate form, with head and horns and general aspect much assimilated to the Húniá. Head moderate-sized with nose considerably but not excessively arched, and somewhat slender, trigonal, compressed and wrinkled horns, curving circularly to the sides, but less tensely than in the Húniá, and the flat smooth points reverted backwards and upwards. In this breed there is even less departure from the primitive type as seen in the Argalis than there is in the Húniá; but the more lengthened ears are pendant entirely as in the latter, and the deer-like tail likewise is somewhat longer than in the wild type, being similar to that of the Húniá. The eye, feet, and groin pits, are all forthcoming and as conspicuously as in the Argalis or in the Húniá. The colour is usually white but sometimes tinged with fawn, especially upon the face and limbs; and black is perhaps less rare as a colour in this breed than in the last. The females of the Silingia are commonly horned, though hornless females are often met with. Great intestines 17 feet, small $55=72$. Cæcum 9 inches long by 3 wide. Width of small gut $\frac{5}{8}$ inch. Of large $\frac{3}{4}$. The tame sheep of Tibet (the Húniá and Silingia) rut in winter and produce young in summer, the females gestating $5\frac{1}{3}$ months. They breed but once a year and produce ordinarily one young at a birth, but frequently two. Their periods of puberty and of longevity have nothing peculiar or different from what is well known of other breeds in other realms.

3. *Ovis Barwál*.—The Barwál. This is a cis-Himálayan breed and the ordinary sheep of the Cachar or northern region of the sub-Himálayas* where immense flocks are reared by the Gúrúng tribe, in all the tracts between Júmla and Kiránt. The breed extends, as I know, from Kumaoon to Sikim, and, as I conjecture, still further beyond these western and eastern limits. The Barwál is especially the breed of the northern region of the cis-Himálayas; and though its strength of constitution enables it to live pretty well in the central region, yet it is seldom bred there, and never in the southern region of the Hills, nor in the plains of India, the heat of which it probably could not endure. The Barwál is the “hero of a hundred fights,” his high courage, vigorous frame, superior size and enormous horns covering and shielding his entire forehead, rendering him more than a match for any foreign

* Bhote purganahs of Traill apud Trans. Asiatic Society.



OVIS BURUAL. The Barwal Sheep.

or indigenous breed of sheep, and a terror even to the bulls. The Barwál in measures of extent, that is, in length and height, is inferior to the Húniá, but superior to that breed in massiveness of entire structure and in weight, and upon the whole, equal in size. Length from snout to vent $3\frac{3}{4}$ to 4 feet. Height $2\frac{1}{2}$ to $2\frac{3}{4}$ feet. Head, to jut of occiput, 11 inches of straight measure, 14 by the curve. Ears 2 to 3 inches. Tail only 7 inches. Tail and wool, 8 inches. Girth behind the shoulder $3\frac{1}{4}$ to $3\frac{1}{2}$ feet. Length of horns, along the curve, $2\frac{1}{2}$ feet. Their basal girth 13 to 14 inches.

The Barwál is singularly remarkable for his massive horns, huge Roman nose and small truncated ears. But this breed, like all the others, possesses without exception all the characteristic marks of the genus, as above defined, and none others denied to that genus, whilst the extraordinary massiveness of its horns, though a deviation from the other tame races, is a normal approximation to the wild type, leaving the high curve of the nasals or chaffron as the only anomaly of the Barwál breed in comparison with its wild prototype, and an anomaly of which the other tame races exhibit marked, though not equal, degrees. The head is large, with a small golden brown eye, a horizontal tiny and truncate ear, pressed down in the old males, by the horn, and seeming as if the end were cut off, a Roman nose such as the Iron Duke might envy, narrow oblique nostrils, showing some faint symptoms of the nude muzzle in the manner of the wild Argalis of Tibet, a short thick neck, a compact deep barrel, rather elevated strong, and perpendicular limbs supported on high short hoofs, and having largish and salient conical false hoofs, behind them, and lastly a short deer-like tail, cylindrico conic, almost entirely nude below, and reaching to about the middle of the buttock.

Both sexes have horns, not a tythe of the females being void of them, and the males scarcely ever without them. The horns are inserted without obliquity, and in contact on the crest of the frontals or top of the head which they entirely cover, and they are directed to the sides with a more or less tense and perfect circular curve, which is sometimes in old age repeated on a smaller scale; but ordinarily the spherical twist is single and leaves the flattened smooth tips of the horns directed outwards and forwards. The form of the horns is trigonal and compressed, as in the other tame and in the wild breeds; and as in the

latter especially, presents a broad surface to the front. There is less compression in the Barwál than even in the wild sheep, so that sometimes, but not usually, the breadth is in excess of the depth at the bases of the horns. The frontal aspect of the horns in the Barwál is, however, always ample, if not quite equal to the lateral aspects, and the three faces, though, in general, flat, have more or less of curvature which is usually convexed, but sometimes rather concaved on the inner lateral aspect: and the cross furrows or wrinkles of the Barwál's horns are as decided and heavy as in its wild prototype. The flesh and fleece are both very abundant but coarse, well suited to the wants of the lusty, rude and unshackled population of the Cachar, but not adapted probably for foreign exportation or exotic rearing. By far the largest number of the Ráhris or coarse blankets and serges, manufactured in the sub-Himálayas, and extensively exported therefrom for native use, in the plains of India, are made from the wool of the Barwál, which, likewise, entirely and exclusively clothes the tribes who rear it, and make the rearing of it their chief and almost sole occupation. The Gúrúngs especially are a truly shepherd, though not a nomadic, race, and they, it is principally, who breed the Barwál, feeding their immense flocks nearer the snows in the hot weather, and further off the snows in the cold weather, but never quitting their own proper habitat as well as that of their flocks, and which is the northern division of the sub-Himálayas. Coarse as is the wool of the Barwál, it is very superior to that of the sheep of the Indian plains, and being of the long stapled kind, the animal might possibly prove a valuable addition to our European stores, either for the wool or for the flesh market, the Barwál being of a hardy constitution, averse only from excessive heat, and feeding and fattening most kindly. The colour of this breed is almost invariably white: but reddish or tan legs and face are sometimes found, and it may even be said '*Rara Ovis in terris, nigroque simillima*,' of this as of the other breeds.

The seasons of rutting and breeding are winter and summer respectively: the gestation is of $5\frac{1}{3}$ months, and but once a year, pampering and high feeding alone ever causing two broods in the year, or deviation from the customary times of female amateness and of delivery, though the male be toujours prêt et beaucoup suffisant pour une troupe des dames.*

* This extreme sexual energy is sustained by proportionate organic development. I do not see how we are to reconcile it with the "fitness of things," unless many more females than males are produced,

The feet, groin and eye pits are all conspicuous in the Barwál. Intestines 121 feet; whereof the small are 94, and the great 27 feet. Cæcum $12\frac{1}{2}$ inches long, and $3\frac{1}{2}$ wide. Several inches of the gut below it, nearly as wide. Rest $2\frac{1}{2}$ to 2 inches in diameter down to anal end. Liver with two principal and five total divisions besides the lobulus and the large gall-bladder loosely attached to the largest lobe in a very partial cleft and at its lower edge.

4. *Ovis Cágia*.—The Cágó or Cágya. This is the especial breed of the central region of the sub-Himálayas, so far as that region can be said to have a breed, for, in sooth, its very rank pasture and high temperature together are very inimical to Ovine animals. There are few sheep in the central hilly region, and none in the lower, till you reach the open plain, and there is found a widely diffused breed, quite different in its superficial characters from any of the hill ones. What sheep are reared in the central region of the hills are of the Cágia breed, but rather by householders than by shepherds, and rather for their flesh than for their wool. The Cágia is a complete Barwál in miniature: yet, like as the two breeds are, each has its own region, nor does the great difference of size ever vary or disappear. Nor are there wanting other differential marks such as the full sized pointed and pendant ears of the Cágia and its shorter stapled and finer wool.

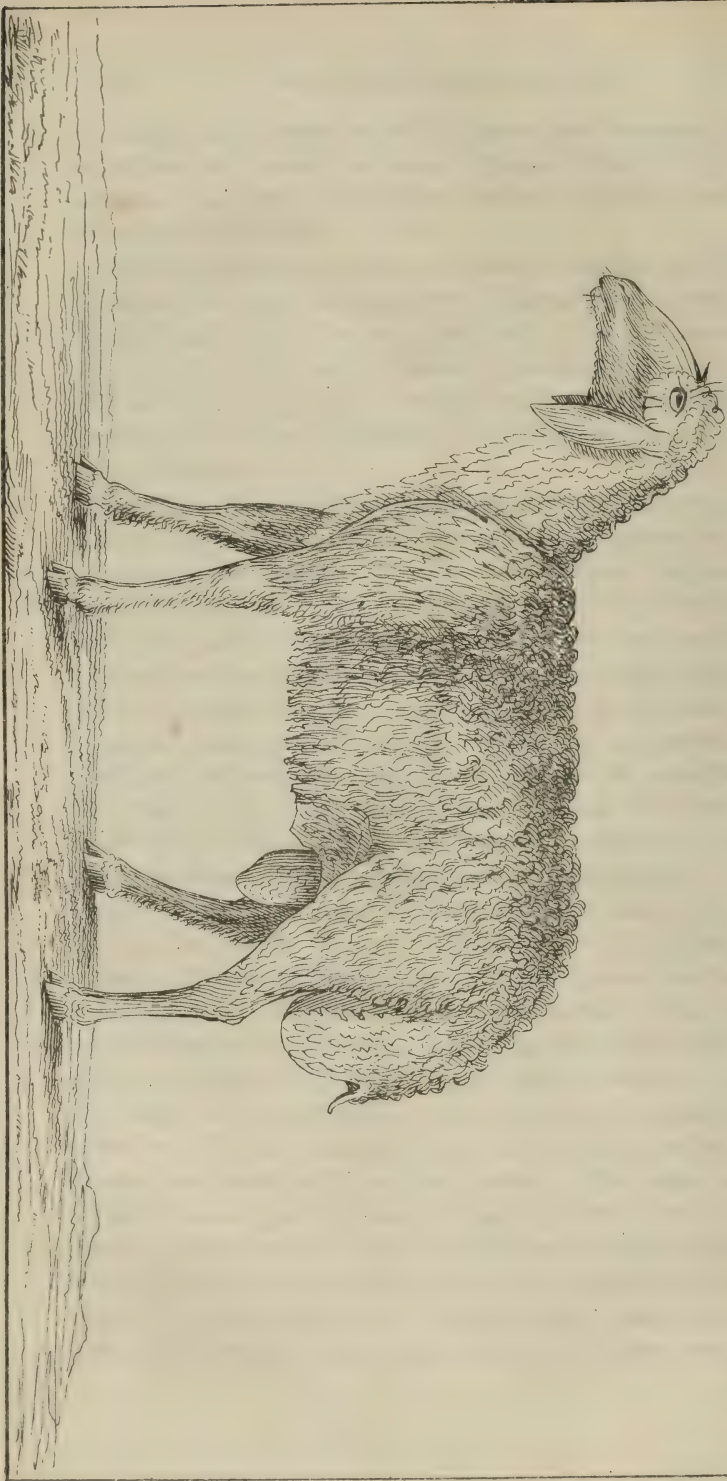
Length from snout to vent 3 to $3\frac{1}{4}$ feet. Height 2 to $2\frac{1}{4}$ feet. Head to occiput by the curve, 13 inches, straight 10 to 11 inches. Tail only, $6\frac{1}{2}$ to 7 inches. Tail and wool, $7\frac{1}{2}$ to 8 inches. Ear $4\frac{1}{4}$ to $4\frac{1}{2}$ inches. Girth behind the shoulder $2\frac{1}{2}$ to $2\frac{3}{4}$ feet.

The Cágia is a small, stout and compact breed, possessed of great strength and soundness of constitution, impatient only of heat, and that much less so than the preceding breeds, eminently docile and tractable, affording mutton of unequalled quality, and wool not to be despised, yet to be praised with more qualification than the meat. Men of rank in Nepaul, who eat mutton, always prefer that of the Cágia, which is certainly superior both for tenderness and flavour to the mutton of any other breed of sheep in these regions. The wool is of short staple but considerable fineness, though inferior much to that of Silingia, somewhat to that of the Húniá, but superior to the wool of the Barwál in fineness, though not equal to it in length of fibre. The people of the central region of the sub-Himálayas, to which region the Cágia sheep

is confined, dress almost entirely in cottons, and consequently do not much heed the fleece of their sheep. But the Newárs of Nepal-proper, where the Cágia most abounds, manufacture its wool into several stuffs, often mixed with cotton.

These manufactures, however, are sheerly domestic, and of little consideration, the products being poor and coarse, though owing more to unskilful manufacture than to the inferiority of the raw material, none of the mountain tribes east of Cashmir, possessing any portion of that high proficiency in the art of weaving, which has for ages given such celebrity to the looms of Cashmir, as of Delhi, of Benares, of Dacca and to Guzerat.

The Cágia sheep is a handsome breed, but the head is too large, the chaffron too prominent, and the legs too short for perfect beauty. The head is large, and massive: the eye small and pale: the ears longish pointed, narrow and pendant; the body full and deep; the legs short and rigidly perpendicular but fine; the tail short and deer-like, as in all the other breeds; the nose only less romanised than in the Barwál; and the massive horns only inferior in thickness to that breed. In the Cágia the horns are trigonal, very moderately compressed, heavily wrinkled, and curved circularly to the sides with a tense flexure, the flat smooth points being usually directed outwards and upwards, but in old age sometimes recurved into a second spheroid, the points still having the same direction as in case of the single spiration. Thus the Cágia is nearly as well armed for battle as the Barwál: but he is less used in that way by the rich and idle, owing to his inferior size and courage. The beautiful lambs are the constant pets of the ladies, this breed being of all the most docile, and made almost a domestic animal by the Newárs of Nepal-proper. The Cágia is confined to the central region of the hills and extends longitudinally, or west and east, from the Naraini to the Dúdh Cosi. The colour is very generally white. Some few are black or ochreous yellow, and the young are apt to be of the last hue, turning white as they grow up. The males are almost invariably horned, and the females frequently, even generally, so; but hornless females are not uncommon. Polycerate varieties seem unknown to the Cágia as to the Barwál breed, but are common in the Huniá, heard of in the Silingia breed. And here I may observe, that I have described the whole of the sheep, and shall do the goats, from *mature*



OVIS PUCCHIA. THE HINDOSTHANI DUMBA.

and perfect males, and have found nothing to remark peculiar to the females beyond the occasional absence of horns, a circumstance invariably noticed in regard to the females; though I may add, once for all, that the females all exhibit the usual inferiority of size, and that their chaffron is always straight, how much soever it be bombed in the males, another indication, by the way, that the Roman nose is an adventitious, not essential, character of the genus. Not so the eye and feet and groin pits, which are organic and essential marks, and as such are universal, the Cágia not less than the others, tame and wild, male and female, exhibiting them all conspicuously. In the same light must be regarded the two teats, though this be a structural peculiarity of wider prevalence and less invariability, serving to assemble into one group (Capridæ) the sheep of all sorts and the goats with many of the Antelopes, yet disappearing in the Hemitrages in the Thárs, Gorals, Chousinghas and others of the proper Antelopine family;* and, what is very remarkable, not absolutely constant even among the true and proper sheep; for I have more than once met with Cágias possessed of 4 teats.

This, however, is a point that must be referred to the category of "questions pour un ami" like the occasional 5 molars of the sheep; and the general reader may rest secure that sheep-proper have 6 molars and 2 teats.

The Cágia sheep ruts in spring and breeds in autumn, most of the young being born at the close of the rains, but without absolute constancy, for the domestic and artificial life of the Cágia leads to its often breeding irregularly throughout the year, and sometimes even twice in one year. One or two young are produced at a birth, and ordinarily in autumn, instances of two parturitions in one year being most rare. I have no memorandum of the intestines. The periods of maturity, decline and death, show nothing calling for note. Having now despatched the several races of tame sheep of the mountains and of Tibet. I might next describe with equal particularity the Tarai sheep, which seems to be identical with that found all over Gangetic provinces, and is characterised by medial size, black colour, a very coarse but true fleece, frequent absence of horns in one or both sexes, a nose romanised amply, very large drooping ears, and a long thick tail frequently passing into the monstrous Dúmba "bussel." But the extent to which

* See paper on the Ruminants, Journal Asiatic Society, above referred to.

my remarks, on the mountain races, have insensibly spread, warns me to return to the hills, and take up, without delay, the other branch of my subject, or the Alpine Goats. I shall therefore merely observe further of the long-tailed sheep of the Gangetic provinces or *Ovis Púchia*,* the *Púchia* of the natives, that its essential structure conforms entirely to the definition of the genus above given, whilst its deviations in subordinate points, (carefully noted above) from the wild and tame sheep of the mountains, distinctly prove the ultimate effects of domestication upon these animals to be, to augment exceedingly the size of the tail, in length and thickness, one or both, to increase the size and destroy the mobility of the ear, and to diminish the volume of the naturally massive horns until they gradually disappear in one or both sexes; the Romanising of the nose, out of all proportion to the “modesty of nature,” as seen in the wild state, being a further and hardly less uniform consequence of domestication, though *not* one which, like the others, seems to augment most under privation of the primitive mountainous abode of these animals, as well as of their liberty and of their consequent power, freely to indulge all their natural propensities. The general Zoology and *Regne Animale*,† *Anotice Dúmbas* (*Ovis steatopyga*) in Tibet; but I am well assured, there are none in any part of “high Asia,” or between the Altai and *Himálaya*, the *Belut Tag* and *Péling*.

GENUS CAPRA.

Goats.

Horns in both sexes.

No mufle,

No eye pits.

Feet pits in the forefeet only, or none.

No inguinal pores nor glands.

No calcic tuft nor gland.

Mammæ two.

Odour intense in males.

A true beard in both sexes, or in the males only.

These animals are further distinguished by horns, directed rather upwards and backwards than circling sideways to the front, as in the

* *Púchia* equivalent exactly to *caudatus*, from *Púech*, a tail.

† Vol. II. p. 390 and IV. p. 330. The *Cabul Dúmba* is polycerate. That of the plains of India differs not from the ordinary sheep, save in the fat tail.

sheep-proper, by the obliquity of their insertion on the top of the head, their less volume, greater compression, less angularity, and, above all, by the keeled character of their sharp anteal edge. The tail of the goats is shorter and flatter than in the sheep; their chest or knees frequently bare and callous; and their hairy pelage apt to be of great and unequal lengths.

It must be remembered that the so-called wild goats of the Himálaya (Jháral or Tehr) are not goats at all; for they have four teats, a moist muzzle, and no interdigital pores or feet pits. Having premised this caution and solicited attention to the above essential and subordinate characters of the goats, I proceed to describe the several tame species of Tibet and of the sub-Himálayas.

1. *Capra Chángará*.—The Chángará. This is the common domestic goat of Tibet, a breed of moderate size, distinguished by the uniform abundance of its long flowing straight hair, which descends below the knees, and hocks, and covers pretty uniformly the whole animal. Even the legs are abundantly provided with hair, though, of course, it is shorter there than on the body, whilst the head, with its ample forelock and beard, worthy of the Shah of the Persia, shows the same tendency to copious development of pelage in this animal, which has likewise a spare sub-fleece of exceedingly fine wool. Length from snout to vent about 4 feet. Mean height 2 feet. Head to occiput, by the curve, 11 to 12 inches, straight 9 to 10 inches. Ears 5 to 6 inches. Tail only, $4\frac{1}{2}$ to $4\frac{3}{4}$. Tail and hair, 9 to 10 inches. Girth behind the shoulder, $2\frac{1}{2}$ to $2\frac{3}{4}$ feet. Horns along the curve, $1\frac{1}{4}$ to $1\frac{1}{2}$ feet. Basal girth of horns, 6 to 7 inches. The Chángará has all the independence of physiognomy and boldness of carriage; but not, perhaps, all the hardihood of the constitution, which Buffon has attributed to the whole race of goats. He is wanton, capricious, restless, impatient of strict restraint, and of docility far inferior to that of the sheep, though better able to endure change of climate, his gay roving eye bespeaking his mercurial temperament, and any attempt to handle him demonstrating his impatience of all but lax control. Ordinarily he is tractable enough; but he will not submit, like his countryman the Húniá, to carry burdens; and he may be bred and herded with facility; but he requires a large range and liberty to please himself whilst grazing.

In the dry cold plains of Tibet, which are every where varied by hills and broken ground, the Chánggrá flourishes exceedingly, and also in the northren region of the cis-Himálayan mountains. He will not only live but breed in the central region of the sub-Himálayas; and with extreme care may be kept alive, but not bred, in the southern region of the hills, and even in the plains. But he merely exists in the two last named locations, and even in the central region of the mountains, he loses the fine silky sub-fleece, retaining the external hairy pelage only, and that much shorn of its "fair proportions." A Kirghis breed allied to the Chánggrá, has been conveyed safely to Europe, and bred there succesfully in the alpine parts of southern France; and, as both this and the Chánggrá are closely allied to the celebrated shaul goat, I have no doubt that either their exquisite sub-fleece or their abundant outer coat could be turned to good account, if not immediately yet after crossing the breed with some nearer appropriate stock such as the Angola or Whidah. The natives of Tibet manufacture ropes, caps, and coarse overalls out of the long hair, and a fine woollen cloth called Tús, out of the sub-fleece, mixed occasionally with the wool of the Silingia sheep. The flesh of the Chánggrá, especially of the kids, is excellent, and is much eaten by the Tibetans and cis-Himálayans, even the Hindús of the central region, importing large numbers for food and sacrifices, especially at the Dasahara, or great autumnal festival. But upon the whole, the Tibetans prefer the mutton of their sheep to that of their goats; and the former are consequently much more abundant in Tibet, and yet more so in the cis-Himálayan district of the Káchár, where alone, on this side the snows, goats or sheep flourish.

The Chánggrá, as I have said, is a breed of medial size, with a fine small head full of expression, a spare and short neck, a long yet full body, short rigid limbs, and a short deer-like tail, rather shorter, more depressed and more nearly nude below, than in the sheep, and frequently carried more or less elevated especially in the males. The narrow oblique muzzle is covered with hair: the longish face and nose quite straight: the short forehead, arched both lengthwise and across, and furnished with an ample forelock: the small brownish yellow and saucy eye placed high up or near the base of the horns. The horns, which are inserted very obliquely on the top of the head, are in contact

with their anteal sharp edges, but diverge towards their rounded postal faces, and curve upwards, outwards and backwards, with much divergency and with one lax spiral twist, leaving the flat smooth points directed upwards and backwards. The compression of the horns is great, so that their basal section is elliptic or rather acute conoid, and the keel is neither very distinctly separated from the body of the horns, nor does it exhibit any salient knots, but is rather blended into the lateral surfaces, and chiefly indicated by the deflexion of the wrinkles of the horns, which are numerous and crowded but not heavy, and go pretty uniformly round the horns, but form a decided angle at the commencement of the keel. The ears are longish, narrow, obtusely pointed and pendant, with very little mobility. The short strong rigid limbs are supported on high vertical hoofs, and have obtusely conic false hoofs, pretty amply developed behind them. The essential structure in these animals is perfectly conformable to the type of the genus as above defined. That is to say, they have hairy noses void of muffle; horns common to both sexes; no trace of gland or of pit below the eye or in the groin; small feet, pits confined to the fore extremities but they are distinctly marked and invariable. No gland nor tuft on the stifle; odour intense in the males; a true beard, proper to both sexes, and invariably forthcoming callosities on the knees; and, lastly, horns inserted like those of sheep on the top of the head, but cultrated to the front, not to the rear, much more obliquely set on the head, more compressed, less angular, and showing palpable evidence of the keel in that particular form which it exhibits in *Oegagrus*,—the true wild type of *Capra* or the goats proper; whereas *Ibex* is a distinct type analogous to the *Mouflons* or *Caprovis*.* In the *Chánggrá* there is, in fact, hardly any deviation from the wild type, except in the large and pendant ears; so that domestication would seem to have made less impression on these animals than on the sheep, though its effects on both groups have been less oblitative than is generally supposed; and it will be seen in the sequel, that all the tame Goats of these regions conform to their assumed wild prototype, with hardly less deviation than is seen in the above careful survey of the *Chánggrá*.

The females of the *Chánggrá* are smaller than the males, and have

* See paper before adverted to in *Journal Asiatic Society*.

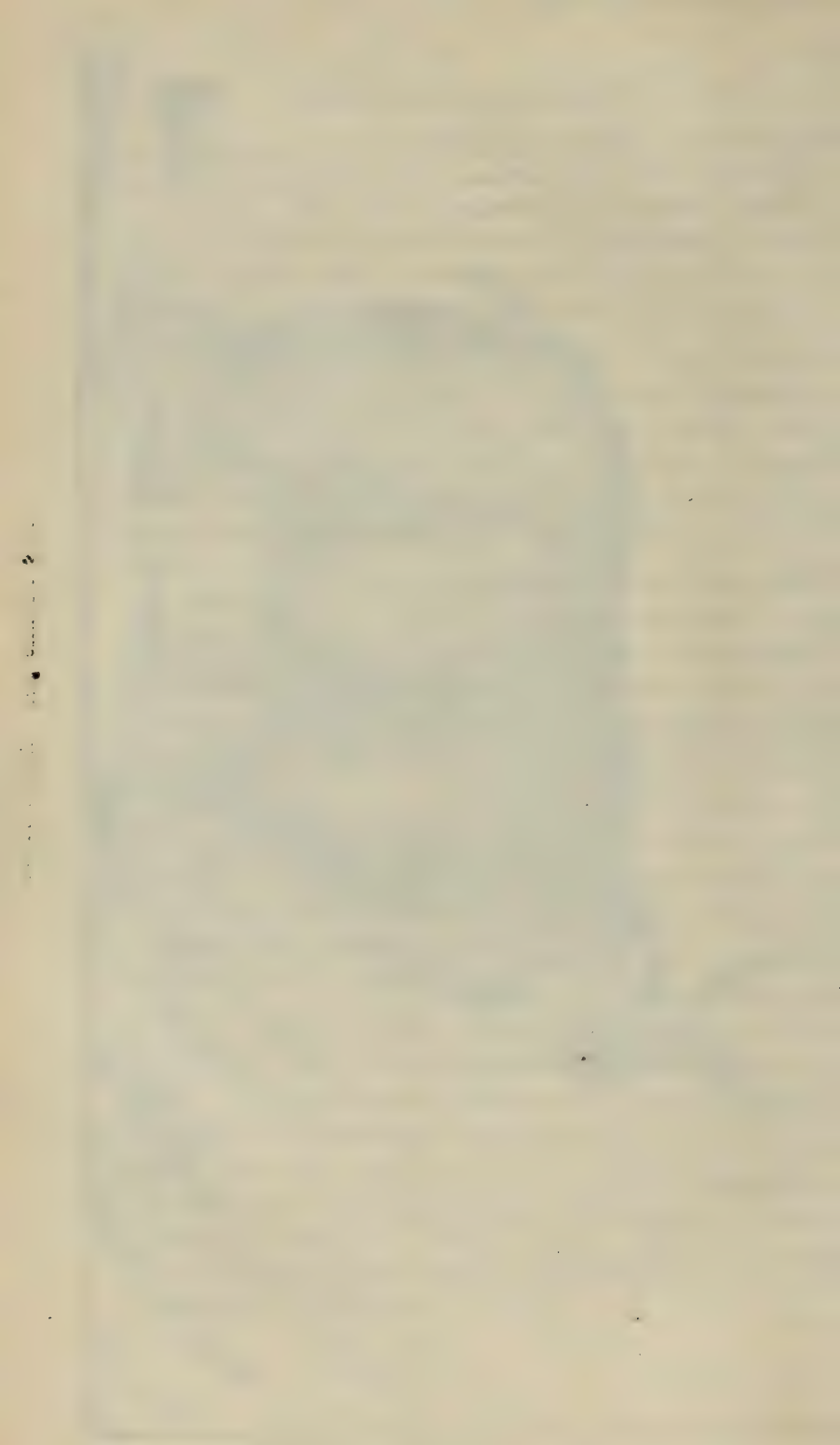
smaller horns nearly void of spiral flexure. But they are bearded, like the males, and otherwise entirely resemble them. The rutting season is early winter: the period of procreation, early summer: and the gestation of about $5\frac{1}{2}$ months, or some 10 days beyond the fifth month, as in the sheep.* One, two, very rarely three, young are produced at a birth. The females begin to breed in the first year of their age: the males to procreate in their second year. They are at their best at 8, old at 10, decrepid at 15, and seldom live beyond 15 to 20 years. I have no memorandum of their intestines. Perhaps the most general colour of the Chánggrá is white, tinged with slaty blue. But the white is seldom unmixed, and the limbs and sides of the head are apt to be dark. There are frequent dark patches on the body, and often the whole body is black or tan, the limbs only and face being white.

2. *Capra Chápú*.—The Chyápú and Chápú of the northern region of the sub-Himálayas. This breed bears the same relation to the Chánggrá as the Cágía sheep to the Barwál, that is, it is invariably of much smaller size than the Chánggrá, and has a different habitat, with great general similarity of structure and appearance, yet not wanting points of diversity. The ears of the Chyápú are invariably smaller, and less pendant than those of the Chánggrá; and what is very deserving of attention the feet pits are not constant in the Chyápú, but are occasionally wanting, as in the Dúgú, a species presently to be described. In the majority of the goats of these regions, the feet pits are present in the anteal extremities without variation: but they are sometimes wholly wanting in all 4 feet of the Chyápú and Sínál; frequently so in all 4 of the Dúgú; and hence we may learn that this mark is more normal in the sheep than in the goats, and that it has a strong tendency to obliteration in the latter. The Chyápú is further distinguished from the Chánggrá by the very various flexure of the horns of the former, which are sometimes erect and sometimes curved backwards in the sickle style; sometimes spirally twisted and sometimes not so; and, again, the ears of the Chyápú, always short as compared with those of the Chánggrá, are occasionally so in the extreme, bearing the turncated appearance of the same organs in the Barwál.

* I have taken all possible pains to determine this point, and am fully aware that the statement of the text conflicts with received opinions.



CAPRA CHAPU. THE CHYAPU GOAT.



Lastly, the Chyápú is neither so frequently nor so much coloured as the Chánggrá. The Chyápú is a small breed, fully a $\frac{1}{3}$ less than the Chánggrá. It measures from snout to vent 3 to $3\frac{1}{4}$ feet, and has a medium height of $1\frac{1}{2}$ to $1\frac{3}{4}$ feet. Head straight, $7\frac{1}{2}$ inches or 10 by the curve. Tail without the hair, $3\frac{1}{2}$: with it, $6\frac{1}{2}$ inches. Ears 3 to 4 inches. Girth behind the shoulder 2 feet. Horns by the curve $1\frac{1}{4}$ to $1\frac{1}{2}$ feet. Their basal girth, 6 inches. Weight of the animal 70 to 80 lbs.

The long hair and fine sub-fleece, the ample forelock and beard common to both sexes, the sexes both horned, the invariable absence of the eye and groin pits, the feet pits present in fore feet only, the long straight face, short arched forehead, keen and saucy eye, short spare neck, long full body, low rigid limbs, short high hoofs, conic obtuse false hoofs, and short depressed tail; and, lastly, the invariable two teats, are marks alike of the Chánggrá and Chyápú. But the gay and independant look of both is augmented in the lesser breed by the finer and more mobile ear, which has all the mobility of the wild state, and is now horizontal, now erect, now forward, and anon backward, as each internal impulse or external signal may prompt.

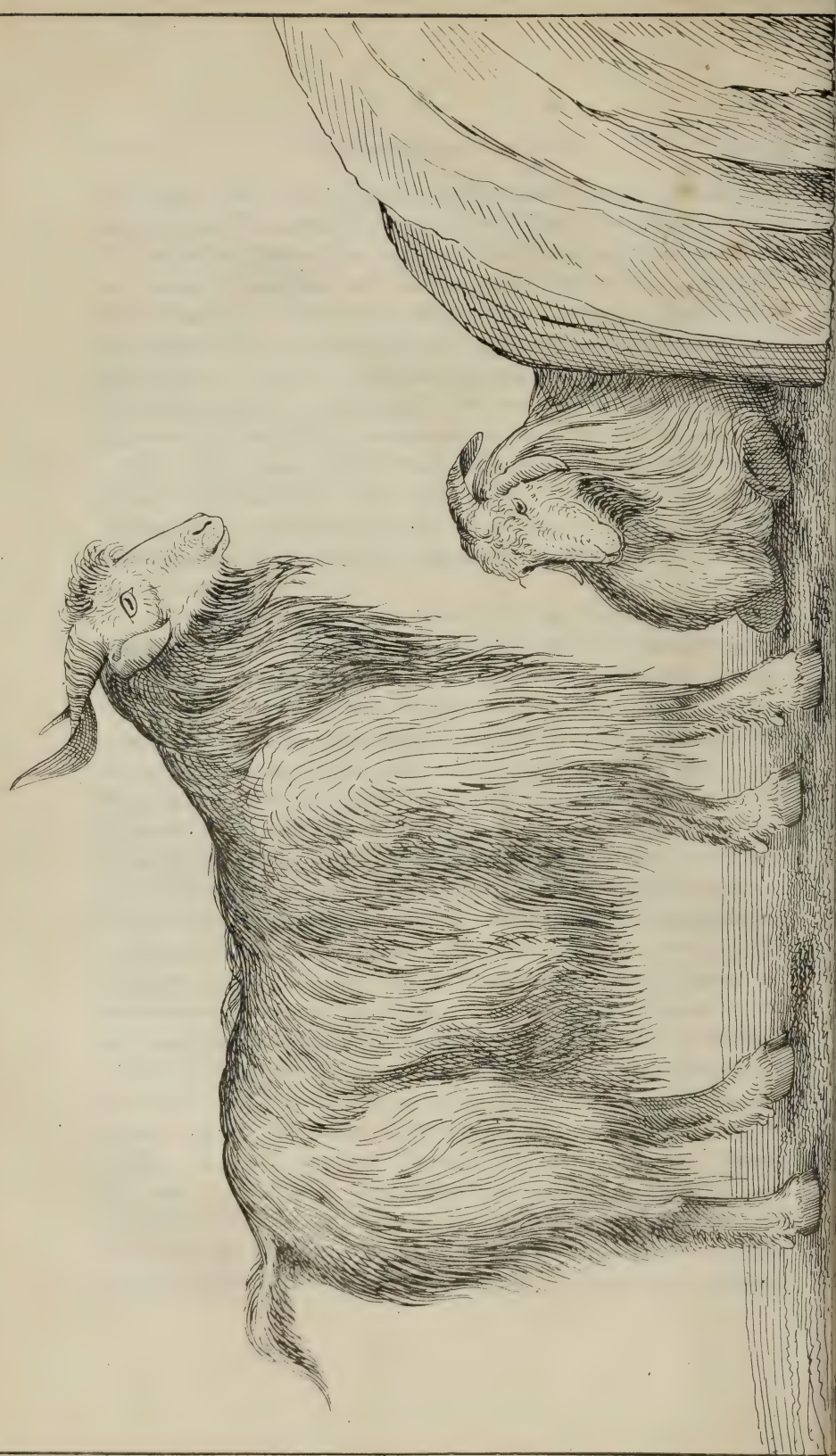
The horns of the Chyápú, as of the Chánggrá, have all the normal characters of the genus, that is, they are inserted obliquely on the top of the head, in contact; and are directed chiefly upwards and backwards. They are keeled, sharpened to the front, widened to the back, and much more compressed than in the Chánggrá, and have a long ovoid section, and their transverse wrinkling is not nodose nor heavy nor distant, but slight and crowded, going all round pretty equally. The females are not much less than the males, nor are their horns very materially less, nor different in form. The prevalent colour is white; but some are mottled or blotched with black or with tan; and the belly and limbs and a lateral mark down the head from horns to nostrils, are often dark. So too are the ears; whilst the prevalent white colour is frequently flavescent and straw tinged.

The Chápús rut in winter and procreate in spring, gestating somewhat more than 5 months or about 160 days; and with regard to maturity, senility and death, they show little or no difference from the Chánggrás. They are of strong constitutions and hardy habits, but love cold and short aromatic pastures, and as these can be found only in the Cachar region of the cis-Himálayan mountains, to it the Chyá-

pús may be said to be confined, the immense numbers of them are imported into the central hilly region during the cold months to satisfy the flesh-loving habits of the people of that region, who also occasionally weave the long hair and fine wool of the Chyápú into appropriate manufactures, as do the Magars, Rongbos and Gúrúngs of the Cachár; and in an œconomic point of view, I apprehend, that the Chyápú not less than the Chánggrá is an object well deserving the attention of all those who aspire to benefit their kind or themselves by multiplying the resources and materials of our stupendous manufacturing system.

The Chánggrá and Chyápú would flourish wonderfully in the driest of our hilly counties, in Wales, England or Scotland; and the sample of Cashmeri workmanship out of the inner fleece of the Chánggrá which I sent to a great house in Lancashire, was declared to be a marvel of beauty.

3. *Capra Sinál*.—The Sinál or Sinjál of the Cachar. This large and finely proportioned breed is the especial race of the Cachar, where the Chyápú, though now abounding, is, no doubt a not very remote immigrant from Tibet. But the Sinál now is, and has been for ages, proper to the more northern parts of the sub-Himálayas, including the whole of the northern region and a small part of the central region. In these latitudes the Sinál abounds from the Kali to the Trisul or from Kumoon to Nepaul proper; and probably beyond these limits, both west and east, though I know it not. The Magars, Gúrúngs, and Khas too, rear the Sinál, whose ample hairy surcoat and fine sub-fleece, though both inferior to those of the Chánggrá and Chyápú, are yet capable of being, and actually are, applied to the manufacture of ropes and of blankets, serges and caps, and only not more efficiently turned to œconomic uses, because the Gúrúngs alone of the above named tribes are wise enough not to affect contempt for arts mechanical; for all arts, in short, but the glorious one of war! The Sinál measures from snout to vent 4 to $4\frac{1}{4}$ feet and $2\frac{1}{4}$ to $2\frac{1}{2}$ feet high. Its head is by straight measure $9\frac{1}{2}$ to $10\frac{1}{4}$ inches, and by curve 12 to 13. Ears 6 to $6\frac{1}{4}$ inches. Tail only, $5\frac{1}{2}$ to 6. Tail and hair, 10 to 11 inches. Horns by curve $1\frac{1}{4}$ to $1\frac{1}{2}$ feet. Basal girth 5 to 7 inches. Girth of the animal behind the shoulder $2\frac{3}{4}$ to 3 feet. The Sinál is a perfectly typical goat, even more so than the Chánggrá, having the horns less excessively compressed and the keel more distinct. The long face is straight.



The short forehead arched. The oblique small muzzle quite hairy and dry. The small pale eye void of any trace of eye pits below it. The largish narrow and pointed ears quite pendant. The moderately compressed horns set on with the full usual obliquity on the top of the head and in contact at their sharp keeled anterior edge, but separate and rounded behind, with an ovoid section and medial uniform wrinkling that is carried $\frac{2}{3}$ towards the flat smooth tips. The direction of the horns is upwards and outwards with great divergency for a goat, and a single lax spiral turn leaving the points directed upwards and a little backwards. The neck is spare. The body long yet compact. The limbs sufficiently elevated, stout and rigid, and like the body, though of course in less degree, showing all the usual tendency to excessive-hairiness. The hoofs short, high, with rigid pasterns and large conic false hoofs. Feet pits in fore feet only or in neither: and medial conico-depressed tail carried curvately erected by the males who, as well as the females, have an ample beard and a moderate forelock. Teats two, as in all the rest. Females smaller but horned; the horns smaller and scarcely spirated. Colours white, or black, or brown, with white or fawn face and limbs; pure white being rarer than in any of the foregoing by much. The Sinál is seldom seen out of his own district, being perhaps less patient of change than the Chánggrá or Chyápú, and for foreign exportation inferior to either of them, as well owing to this inferior hardihood, as to the smaller quantity and coarser quality of the fine sub-fleece. The mutton is good and the flesh of the kids greatly and justly prized, being far superior to that of lambs of any breed; and the milk alsó, like that of the other goats, is greatly and justly esteemed. The Sináls rut in autumn and procreate in spring, the females gestating upwards of 5 months, as I am positively assured, and as is true of the Ibexes, but not supposed to be so of the *Ægagri* or of the tame goats.*

Intestines 72 feet whereof the small are 53 and the great 19 feet. Cæcum 12 inches long by 3 wide. Great gut near it 2 inches wide. Another male. Intestines 78 feet, whereof small 59, and great 19 feet.

* See and compare general Zoology II. p. 373 and English Regnè Animal IV. pp. 298 and 301. That points like this should be subject to doubt may show the ordinary observer how much he has it in his power to do by merely using his opportunities of observation in India.

Cæcum 12 inches by 3. Knees and chest nude and callous. Sub-fleece frequently wanting. Almost always so in summer.

4. *Capra Dágú*.—The Dágú. This is the Goat of the central region of the sub-Himálayas. But the remark applied to this region in reference to the sheep holds almost equally good as to the goats. In fact the central and lower regions of the sub-Himálayas are unsuited to goats or sheep owing to their rank pasture, excessive moisture and enormous superabundance of leeches and other parasitic creatures generated by heat and moisture amid a luxuriant vegetation. The Dágú is bred only in small numbers by householders—and only for home consumption of the milk and flesh, both of which are excellent and eagerly consumed by the highest castes. The Dágú extremely resembles, and is probably identical with, the ordinary domestic goat of the lower provinces, that of the upper provinces—viz. the large gaunt Roman-nosed, monstrous-eared Jamnapári—being unknown to these mountains, and unable to endure their climate in any part. The Jamnapári (*Capra Jamnapária*) becomes in the mountains goitrous, casts its young prematurely, breeds not, and hardly exists. But the little goat of moist Bengal does very well in the moist climate of the central and lower hills; and accordingly, I believe, that as the upper region of the hills is indebted to Tibet for its goats, so the central and lower regions are indebted to Bengal and Behar for theirs,* and that the animal we are now to describe is at least, in origin, the common domestic Goat of the Gangetic provinces, from Allahabad to Calcutta nearly.

The Dágú of the central or lower regions of the hills is distinguished from all the breeds of Tibet and of the Cachar by the frequent absence, in the females particularly, of the long hair, and the nearly as frequent absence of the interdigital pits, belonging to those races or breeds. The males however of the Dágú breed are often as shaggy as the Chánggrá or Sinál; whilst in the latter species, as we have seen, the feet pits are not invariable. Upon the whole, “feet pits in the fore feet only or none” seems to be the proper generic formula quoad this organ; whilst long or short hair can be admitted only as a very subordinate character; and with those exceptions, the Dágú is thoroughly

* F. Cuvier's notices of Nepalese goats are altogether apochryphal, though copied au pied de la lettre by the English Editors of the *Regnè Animal and Natural Library*. The exotics of the Residency have become Nepal species, and the poor Jamnapari which we tried so vainly to acclimatise, figures as *the Nepal Goat*!!!

conformable both in essential and in subordinate points to the characters we have called generic, and as such placed at the head of our paper; so that, as has been already remarked, domestication would seem to have produced much less impression on the primitive goat, as typed by *Oegagrus* than on the primitive sheep as typed by Ammon.

The Dúgú measures from snout to rump $3\frac{3}{4}$ to 4 feet and about 2 feet in height. Head by the curve 11 to $11\frac{1}{2}$, straight 9 to 10 inches. Tail only 5. Tail and hair $8\frac{1}{2}$. Ears $5\frac{1}{2}$ to 6 inches. Horns by curve 14 to 16. Their Basal periphery 6 to 7. Girth of chest 2 to $2\frac{1}{4}$ feet. The Dúgú is of medial size and well proportioned, the male being much larger than the female, and frequently shaggy, whilst she is always smooth. There is no sub-fleece and the hair is coarse and turned to no use, the skin only being of value when the flesh is disposed of, and the skin but rarely and unskilfully turned to use. The muzzle of the Dúgú is dry and hairy: the face unarched: the forehead considerably so: the ears largish and horizontal or pendant: the moderate horns turn up simply backwards, without spiral twist and with but a vague keel, though it be traceable enough in the anteal sharp edge: the neck spare: the body longish yet full: the rigid limbs nor short nor long, with high short hoofs and conic false hoofs: and, lastly, medial tail, depressed and nude below and curvately raised in the males. The eye pits and muffle and groin pits are as invariably absent as in the other breeds; and the feet pits more frequently wanting than in any. The beard is ample in both sexes, and the females always have horns and two teats; and their hair is close and smooth. Intestines 93-7, whereof the small are 70 and the great 23 feet 7 inches. Cæcum 13 inches by 4. Another 108 feet, whereof small are 82, and great 26 feet, and the Cæcum 3 feet! The Dúgú breeds all the year round, but most young are produced at the close of the rains in autumn, being begotten in spring. Two are frequent at a birth, and two births in a year have been heard of; but most rarely, and well may be so, if it be true, as insisted on to me, that this breed likewise gestates above 5 months or 160 days.*

And now, before concluding this long paper, I will take leave to remark, that the facts so carefully amassed, the fruit of years of patient

* For the period of Caprial gestation see Penny Magazine sub voce, as well as the General Zoology and Regnè Animal as quoted supra.

observation, should serve, not merely to illustrate the essential characters of two groups of animals heretofore ill discriminated, but should also throw much light on those interesting questions, the effects of domestication and of climate upon the natural organisation, and the natural habits and range of species, subjects of high interest, no doubt, though a degree of ridicule has been cast upon them by the pompous dissertations of those who were at as little pains accurately to determine the geographical as the Zoological data disserted upon.

*Illustrations.**

1. The Silingia Sheep.
2. The Barwál Sheep.
3. The Cágiá Sheep.
4. The Dúmba variety of the Púchiá Sheep or of common breed of Gangetic provinces.
5. The Chyápú Goat.
6. The Sinál Goat.
7. Feet pits of sheep and of goats, and heads of Barwál and Silingia Sheep.

All figured for the first time and from nature.

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CATALOGUE OF REPTILES

*Inhabiting the MALAYAN PENINSULA and ISLANDS,*

*Collected or observed by THEODORE CANTOR, Esq., M. D., Bengal.  
Medical Service.*

(Concluded from No. CLXXXI.)

—

VENOMOUS SERPENTS.

FAM. VIPERIDÆ, Bonaparte.

SUB-FAM. BUNGARINÆ, Bonaparte.

TERRESTRIAL.

GEN. ELAPS, *Schneider.*

Head more or less indistinct, neck not dilatable; mouth and eyes small, trunk elongated, throughout of nearly equal circumference, very smooth; tail short, tapering, beneath with scutella.

\* For the accompanying illustrations the Editors are indebted to the liberality of James Hume, Esq., at whose lithographic press they were executed.—Eds.

ELAPS MELANURUS, (Shaw.) (See Plate XL, Fig. 6.)

SYN.—Russell I. Pl. 8. (young).

Coluber melanurus, Shaw, (young.)

Vipera trimaculata, Daudin, (young.)

Elaps trimaculatus, Merrem, apud  $\left\{ \begin{array}{l} \text{Wagler,} \\ \text{Schlegel,} \end{array} \right\}$  (Young.)

Strongly iridescent light bay above ; from the muzzle a longitudinal black band, joining on the neck a broader transversal black band with whitish edges ; a short oblique black line behind the eye, and a similar from the nostril to the middle of the upper lip ; on each side of the anterior part of the back a series of distant black dots ; a broad black transversal band with whitish edges, at the root of the tail ; a second similar, at a short distance from the apex ; lips, throat and the anterior part of the abdomen iridescent yellowish white, changing to yellow or orange on the posterior part ; the tail beneath bluish white, with large irregular black spots. Iris black ; pupil circular ; tongue black.

Scuta 205 to 247 ; Scutella 24 to 32.

HABIT.—*Malayan Peninsula.*

Tenasserim, Nerva, (Coromandel.)

In general appearance this species nearest approaches *Elaps intestinalis*, (Laurenti), but the eye is comparatively larger, while the nearly equilateral, hexagonal, vertical shield is smaller in the present. The eye is surrounded by two post-orbitals, one præ-orbital, and beneath by the third and fourth upper labials. Of the latter seven pairs cover the jaws. The trunk is throughout covered by 13 series of smooth, sub-imbricate, rhombic scales. The one described by Russell, hitherto the only describer from nature, was a young animal. A similar, upwards of a foot in length, was killed in Province Wellesley. But the late Mr. Griffith in one of his botanical excursions, captured an individual of the following dimensions :

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | 0 $\frac{5}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 1     | 10 $\frac{2}{8}$      |
| Ditto ditto tail, . . . . .   | 0     | 1 $\frac{4}{8}$       |
|                               | <hr/> |                       |
|                               | 2 ft. | 0 $\frac{3}{8}$ inch. |

Circumference of the trunk 1 inch.



## ELAPS INTESTINALIS,\* (Laurenti,) VAR.

SYN.—*Maticora lineata*, Gray : Ill. Ind. Zool.

*Elaps furcatus*, Schneider, Var. apud Schlegel, Cantor.

*Young and Adult*.—Head above light chestnut ; lips and throat yellowish white, upper lips spotted with black ; from the hindhead to the tip of the tail a vermilion line, on each side of which a narrow, serrated, black line. On the nearest two longitudinal series of scales the ground colour appears as a reddish light grey longitudinal line, beneath bordered by an equally broad black line, under which a narrow buff-coloured line, bordered by a black serrated line, the teeth of which are directed downwards, wedged in between the lateral margins of the scuta and scutella. Scuta alternately pale citrine and iridescent black, the latter colour occupying three to four scuta together, while the former rarely appears on more than two. Tail above with two or three distant black transversal bands ; beneath vermilion, with a continuation of the superior transversal bands. Iris black, pupil circular ; tongue black.

Scuta 223 to 238 ; Scutella 24 to 26.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Sumatra.

Excepting the colours, this variety otherwise perfectly agrees with *E. intestinalis*. The neck is covered by 15, the rest of the trunk by 13 longitudinal series of smooth, not imbricate rhombic scales. It is of no uncommon occurrence in the hills of Pinang, at Malacca, and at Singapore. The largest individual was of the following dimensions :

|                               |                              |
|-------------------------------|------------------------------|
| Length of the head, . . . . . | 0 ft. 0 $\frac{3}{8}$ inch.  |
| Ditto ditto trunk, . . . . .  | 1 10                         |
| Ditto ditto tail, . . . . .   | 0 1 $\frac{4}{8}$            |
|                               | <hr/>                        |
|                               | 1 ft. 11 $\frac{7}{8}$ inch. |

Circumference of the trunk 1 $\frac{2}{8}$  inch.

\* SYN. Seba II, Pl. 2, Fig. 7.—*Aspis intestinalis*, Laurenti.—*Coluber intestinalis*, Gmelin.—Russell II, Pl. 19.—*Elaps furcatus*, Schneider.—*Coluber intestinalis*, Shaw.—*Vipera furcata*, Daudin.—*Elaps furcatus*, Schneider, apud Wagler, Schlegel.

HABIT.—Java, Malwah, (Central India.)

A collection of Reptiles, which Mr. J. W. Grant obtained from Saugor, Malwah, contained a single specimen.

## ELAPS NIGROMACULATUS, Cantor. (See Plate XL, Fig. 7.)

SYN.—*Calliophis gracilis*, Gray : Ill. Ind. Zool. (Young.)

“ Probablement nouvelle espece d’Elaps,” Schlegel : Essay, p. 451. (1\*)

*Elaps nigromaculatus*, Cantor : Spicil.

Head above yellowish brown, each shield with a pale black spot in the middle ; lips and throat yellowish white, spotted with pale black. Ground colour of the trunk and tail reddish light grey, longitudinally divided by a central black line with small round, black, white-edged spots about an inch apart ; on each side two parallel black lines, the lower of which bordering the two lowest series of scales of the sides, which are white edged with black, so as to appear longitudinally intersected by two black lines. All the lateral black and white lines are on each side intersected by a series of large rounded (the anterior pair elongated), black spots with white edges, placed in pairs, opposite each other, but in quincunx order with the smaller black spots of the dorsal line. Beneath alternately yellowish white or pale citrine, and iridescent black, both colours nearly equally divided. Tail at the root, and near the apex with a broad transversal black band, edged with white, both continued on the vermilion lower surface, and there, between them, a third similar band. Iris black, pupil round ; tongue bluish grey.

*Young*.—Marked like the adult, but the ground-colour of the back and tail inclines to light reddish brown.

Scuta 238 to 311 ; Scutella 21 to 28.

HABIT.—*Pinang, Singapore*.

In general appearance this species very closely resembles *Elaps intestinalis*, from which it is distinguished by the following characters.\* The two pairs of frontal shields are remarkably disproportionate, the frontals (proper) being much the larger : next to the occipitals they are the largest of the crown-shields. The nearly equilateral, hexagonal vertical, and the supra-orbitals are remarkably small : more so than in any other species of this genus. The occipitals are very narrow elongated ; their external margin bordered by two pairs of shields of which the anterior, the larger, covers the temples, and is beneath bounded by

\* The (magnified ?) representation of the head of “ *Calliophis gracilis*,” Fig. 2. Ill. Ind. Zool., is in every particular incorrect.

the fifth and sixth upper labials. The eye is sunk, excessively minute, surrounded by two small post-orbitals; beneath by the third and fourth upper labials, and by a single narrow triangular præ-orbital. The latter is placed obliquely, so that the downwards pointed apex meets the linear posterior part of the nasal, or as it is considered by some, the frenal. The nostrils are comparatively large. The upper labials number six on each side: the two posterior are the largest. The chin is covered by two pairs of elongated narrow shields, externally bordered by the third and fourth, the largest of the six inferior labials. The gular scales are more numerous than those of *E. intestinalis*. The neck is covered by 15, the trunk by 13 longitudinal series of smooth rhombic scales with rounded points. This species is of no uncommon occurrence in the hills of Pinang. The largest individual was of the following dimensions:

|                               |                             |
|-------------------------------|-----------------------------|
| Length of the head, . . . . . | 0 ft. 0 $\frac{4}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 2 1 $\frac{3}{8}$           |
| Ditto ditto tail, . . . . .   | 0 1 $\frac{3}{8}$           |
|                               | <hr/>                       |
|                               | 2 ft. 3 $\frac{2}{8}$ inch. |

Circumference of the trunk, 1 inch.

#### ELAPS BIVIRGATUS,\* Kuhl, VAR.

SYN.—*Elaps flaviceps*, Cantor, Spicil.

*Elaps flaviceps*, apud J. Reinhardt: Beskrivelse, &c.

Head, lips and throat vermilion; trunk above brilliant iridescent, intense black, most of the scales partially edged with azure, not however sufficiently to produce regular network; the two lowest series of scales on each side azure, forming a continued lateral band, longitudinally divided by a white zig-zag line, produced by the scales being partially edged with white. Beneath vermilion; each scutum with two lateral, square, black spots, forming a continued black band bordering the azure. Tail above with a narrow black dorsal line; sides and scutella vermilion. Iris and tongue black.

Scuta 248 to 277; Scutella 38 to 45.

\* SYN.—*Erpetologie de Java*, Pl. 44.—*Elaps bivirgatus*, apud Schlegel.

HABIT.—Java, Sumatra.

HABIT.—*Pinang, Malayan Peninsula.*

In colours the young ones resemble the adult. The neck is covered by 15, the trunk by 13 longitudinal series of smooth rhomboidal scales. The anterior part of larynx, instead of adhering to the upper part of the membranous sheath enclosing the tongue, presents the peculiarity of being free and projecting in the mouth like a small tube.

Of four individuals observed, the three were from the hills of Pinang. The largest was of the following dimensions :

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | $0\frac{5}{8}$ inch.  |
| Ditto ditto trunk, . . . . .  | 2     | $7\frac{6}{8}$        |
| Ditto ditto tail, . . . . .   | 0     | $3\frac{2}{8}$        |
|                               | <hr/> |                       |
|                               | 2 ft. | $11\frac{5}{8}$ inch. |

Circumference of the trunk,  $1\frac{4}{8}$  inch.

---

*Elaps intestinalis*, *Var*, *E. nigromaculatus*, and *bivirgatus*, *Var*, appear at Pinang exclusively to inhabit the hills at a considerable elevation, but on the Malayan Peninsula, and at Singapore they occur in the valleys. Although not numerous, they cannot be said to be of rare occurrence. They are strictly terrestrial, and have their hiding places under the roots of trees, and in the crevices of rocks. They are sluggish, awkwardly dragging their long slender bodies, and they are generally observed lying motionless, with the body thrown in many irregular folds, but not coiled. Although they are diurnal, their sight from the minuteness of the pupil, appears to be as defective as their sense of hearing, and they may be closely approached, without apparently their being aware of danger. If touched with a stick, they make a few strenuous efforts to slide away, but they soon stop, and if further pursued, they make some irregular spasmodic-like movements, but they have not been observed to bite. An adult *Elaps bivirgatus*, *Var*, was on a single occasion seen to raise the head vertically about two inches from the ground. In captivity they refuse food and water, and die in a short time from inanition. Of a number examined, only one of the latter species had in the stomach the remains of a small serpent, the genus of which could not be determined. M. Schlegel has observed *Calamariæ* in the stomach of *Elaps intestinalis*. In the peculiar dis-



tribution of colours, in diminutive size, and in habits they resemble the genus *Calamaria*. It is solely the smallness of the mouth which renders the preceding species of *Elaps* harmless to man, as from the following it will be perceived, that their venom is as virulent as that of other venomous serpents. From the diminutive size of the venomous glands, the quantity of fluid secreted is small: scarcely more than a drop from each. It is a pellucid, colourless fluid, slightly reddening litmus paper.

After several unsuccessful attempts to make an adult *Elaps nigromaculatus* spontaneously bite a fowl, the jaws were forcibly closed over a protracted fold of the skin on the inner side of the left thigh of the bird. On account of the small gape, some difficulty was experienced in making the jaws close over the fold of the skin, and, as it appeared doubtful if the fangs had penetrated, the serpent was in a quarter of an hour compelled again to wound the fowl in the skin below the right eye. Twenty minutes after the first wound the fowl became purged, and manifested symptoms of pain in the left thigh, which was continually drawn up towards the body, although the wounds inflicted there, and below the eye, were, from the smallness of the fangs, barely visible. Twenty eight minutes after the first wound the bird commenced drooping, occasionally attempting to raise itself, and in 10 minutes more soporism occurred, interrupted by spasms of the neck, flow of saliva, and pecking the earth with the beak, while the pupil was spasmodically contracted, and alternately dilated. The latter symptoms continued during thirty minutes, when death occurred in an hour after the first wound had been inflicted. Fowls wounded by *Elaps furcatus*, *Var*, and *Elaps bivirgatus*, *Var*, expired under similar symptoms, from within an our and twenty minutes, to upwards of three hours. The serpents which all had forcibly to be made to inflict the wounds, shortly afterwards expired, apparently from the violence to which they had been subjected.

#### GEN. BUNGARUS, *Daudin*.

Body elongated, slightly cylindrical; tail short; head oval, trunk and tail with a dorsal series of large hexagonal scales; the tail beneath with scuta, in the middle sometimes with scutella; behind the fangs some simple maxillary teeth.

## BUNGARUS FLAVICEPS, J. Reinhardt.

*Young*.—Head and neck blood-red, with a pointed elongated black mark between the occipitals, and a short black dorsal line on the neck; the trunk black with steel-blue reflections, at the anterior part of each dorsal hexagonal scale a short longitudinal white streak; near the tail blood-red; each scale of the two lowest lateral series, white with a black spot, placed so as to produce a continued lateral, white zig-zag line; the posterior part of the sides blood-red. Lips and throat blood-red; abdomen black, posterior part as well as the tail blood-red, with a few black spots. Iris and tongue black.

Scuta abdominalia 209, Scuta sub-caudalia 16; Scutella 38.

HABIT.—*Pinang*.

Java.

M. J. Reinhardt has described the adult from an unique specimen in the Royal Museum, Copenhagen. Spirits of wine change the brilliant blood-red to a pale yellow colour. The diagnosis must therefore be altered accordingly. The adult appears to differ from the young, in having none of the black marks of the head and tail, and no lateral white line.

A single young individual, found by Sir William Norris, on the Great Hill of Pinang, was of the following dimensions:

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | 0 $\frac{5}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 1     | 4 $\frac{4}{8}$       |
| Ditto ditto tail, . . . . .   | 0     | 3                     |
|                               | <hr/> |                       |
|                               | 1 ft. | 8 $\frac{1}{8}$ inch. |

Circumference of the neck 1, of the trunk 1  $\frac{2}{8}$ , of the root of the tail  $\frac{5}{8}$  inch.

The centre of the back forms a ridge, from whence the sides slope; the abdomen is broad, slightly arched, so that the vertical section of the body becomes broad triangular. The neck is covered by 15, the trunk by 13 longitudinal series of smooth, imbricate, rhomboidal scales. As observed by M. J. Reinhardt, the correspondence of colours, and their distribution, between this species and *Elaps bivirgatus* is very striking. Besides, the number of series of scales, is another character, approximating this species to the genus *Elaps*.

## BUNGARUS CANDIDUS, (Linné.)

SYN.—Seba II, T. 66, Figs. 3 and 4.

Coluber candidus, Linné.

Russell I, Pl. 1. Paragoodoo.

Russell II, Pl. 31. Sew Walaley.

Pseudoboa cœrulea, Schneider.

Boa lineata, Shaw.

Bungarus cœruleus, Daudin.

Bungarus semifasciatus, Kuhl.

Aspidoclonion semifasciatum, Wagler.

Bungarus semifasciatus, Schlegel.

Above black with steel blue reflections, interrupted by numerous narrow transversal white bands, produced by the white edges of the scales. On each side the bands are bifurcated, and the two or three lowest series of scales, white with black spots. Lips and throat white; abdominal surface yellowish white. Iris black; tongue white.

Scuta 201 to 221; Scuta sub-caudalia 38 to 56.

HABIT.—*Malayan Peninsula.*

Java, Tenasserim, Bengal, Assam, Coromandel, Ceylon, Malabar.

A single young individual, killed by Capt. Congalton near Keddah, was of the following dimensions:

|                               |       |                      |
|-------------------------------|-------|----------------------|
| Length of the head, . . . . . | 0 ft. | 1 inch.              |
| Ditto ditto trunk, . . . . .  | 2     | $3\frac{6}{8}$       |
| Ditto ditto tail, . . . . .   | 0     | $4\frac{5}{8}$       |
|                               | <hr/> |                      |
|                               | 2 ft. | $9\frac{3}{8}$ inch. |

Circumference of the neck  $1\frac{6}{8}$ , of the trunk 2, of the root of the tail  $1\frac{1}{8}$  inch.

Assam produces also a constant variety (*B. lividus*, Cantor) of a uniform blue black above; beneath yellowish white: in some the scuta blackish with white edges. In the very young the head is white with a black line between the occipital shields. It farther differs in having the hexagonal scales smaller, less distinct from the rest, and the tail more robust than the normal individuals.

## BUNGARUS FASCIATUS, (Schneider.)

SYN.—Scheuchzer, Pl. 655, Fig. 8.

Seba II, Pl. 58, Fig. 2.

Russell I, Pl. 3. Bungarum Pamah.

Pseudoboa fasciata, Schneider.

Boa fasciata, Shaw.

Bungarus annularis, Daudin.  
Aspidoclonion, Wagler.  
Bungarus annularis, Schlegel.

Ground colour bright gamboge ; the anterior half of the head, and the cheeks black with steel blue reflections ; from the vertical shield a black longitudinal band, expanding over the neck and sides, and with the former forming a broad arrow mark ; lips and throat gamboge, upper lips edged with black ; the rest of the body completely surrounded by a number of broad, alternate gamboge and shining black, rings. Iris black ; tongue flesh-coloured.

Scuta 200 to 233, Scuta abdominalia 32 to 36.

HABIT.—Pinang, Malayan Peninsula.

Java, Tenasserim, Bengal, Coromandel.

The neck is covered by 17, the trunk by 15 longitudinal series of smooth scales, which with the exception of the dorsal hexagonal series, are imbricate, rhombic. As noted under *Elaps bivirgatus*, Var, the larynx is not attached to the scabbard of the tongue. Of three young individuals from the valley of Pinang and Province Wellesley, the largest was of the following dimensions :

|                           |       |                        |
|---------------------------|-------|------------------------|
| Length of the head, ..... | 0 ft. | 1 $\frac{2}{8}$ inch.  |
| Ditto ditto trunk, .....  | 3     | 5                      |
| Ditto ditto tail, .....   | 0     | 4 $\frac{4}{8}$        |
|                           | <hr/> |                        |
|                           | 3 ft. | 10 $\frac{6}{8}$ inch. |

Circumference of the neck 2, of the trunk 3  $\frac{2}{8}$ , of the root of the tail 2, of the apex 1  $\frac{3}{8}$  inch.

In the Malayan countries the species of *Bungarus* are not numerous, but *B. candidus*, and *fasciatus* are of no uncommon occurrence in Bengal and on the Coromandel Coast, where, however, it should be observed, a class of the natives (“serpent-charmers,”) earn a livelihood by capturing and exhibiting serpents, but this craft is unknown among the Malays. The preceding three species, like the rest of the venomous serpents, are very ferocious when attacked, but unprovokedly they are not known to attack man : on the contrary, when met in the jungle, they attempt to escape. When trod upon, or struck, their rage is instantly excited, in self-defence they will even turn from their retreat, and then their habitual sluggishness is roused to furious activity.



Preparing to attack, the head is, by a short curve of the neck, brought closely to the body, and drawn far backwards, when suddenly darting the anterior part of the body obliquely upwards, they bite. The height of the place where the wound is inflicted, of course depends on the length of the serpent, which is capable of darting nearly the anterior half of the body. Notwithstanding the circular pupil, they appear to shun the light, hiding the head under the folds of the body, and they are singularly uncertain in their movements, often suddenly jerking the head or tail without any apparent object. Like all serpents of tropical Asia, they seldom expose themselves to the sun: when during the day they leave their hiding places, they select the shade. The genus *Bungarus* is terrestrial, feeding on rats, mice, serpents, (*Col. mucosus*, Lin.) and toads. Like other venomous serpents, when the venom has been inflicted on their prey, they disengage it from the fangs, sheathe and place them as horizontally as possible, in order that they may offer no resistance to the introduction into the mouth of the lifeless prey, which is now seized head foremost. The innocuous serpents bite or strangle their prey, which when life is extinct is either swallowed at once, or if it happens to have been killed in a position, likely to render the deglutition difficult, is often disengaged from between the teeth, and seized a second time, by the head. In captivity these serpents refuse food, but greedily lap up, and swallow water.

A fowl four minutes after it had been bitten on the innerside of the thigh, by a *Bungarus fasciatus*, fell on the wounded side, and was shortly after seized with slight purging. The eyes were half closed, the pupils alternately dilated and contracted, immobile. In 17 minutes slight spasms occurred, under which the bird expired 43 minutes after it had been wounded.

Another fowl wounded in the same place as the former, by the same serpent, but after an interval of seven hours, expired under similar symptoms, only more violent spasms, in the course of 28 minutes.

Venom taken from another serpent, the fangs of which had been extracted, was inoculated by a lancet-incision in the right thigh; four minutes after the fowl was seized with trembling, fell, and remained lying on the wounded side, with the eyes closed, but it gradually recovered, and rose apparently recovered, 30 minutes after the inoculation of the venom.

Other fowls were killed by different serpents of this species, in 20 to 31 minutes.

Fowls bitten by *Bungarus candidus* expired under similar symptoms, within 30 to 45 minutes; dogs from within 1 hour 10 minutes, to 2 hours, under symptoms noted in Russell's experiments (Russell I, page 53.)

SUB.-FAM. NAJINÆ, Bonaparte.

HAMADRYAS, Cantor.

Head broad, sub-ovate, depressed, with a pair of very large post-occipital shields, and a short, blunt muzzle; cheeks tumid; eyes large, prominent, pupil circular; nostrils wide, between two shields; behind the fangs a few maxillary teeth; neck dilatable; trunk thick, cylindrical; tail short, with Scuta and Scutella.

HAMADRYAS OPHIOPHAGUS, Cantor.

SYN.—Hamadryas hannah, Cantor.

Naja elaps, Schlegel, (Young.)

Naja bungarus, Schlegel, (Young.)

Naja vittata, Elliot.

Hamadryas ophiophagus, apud Elliot.

Olive green above; the shields of the head, the scales of the neck, posterior part of the body, and of the tail edged with black; the trunk with a number of distant, oblique, alternate black and white bands, converging towards the head; the throat and anterior part of abdomen impure gamboge, the rest of the scuta and scutella bluish grey, marbled with black, or pale yellowish green, with a narrow sub-marginal brown line. Iris golden, spotted with black; tongue bluish black.

Scuta 215 to 256, Scuta sub-caudalia 13 to 32; Scutella sub-caudalia 63 to 96.

HABIT.—Pinang, Singapore, Malayan Peninsula.

Java, Sumatra,\* Bengal, Assam,† Coromandel.

Of two individuals, from the summit of the Great Hill of Pinang, and from Province Wellesley, the larger was of the following dimensions:

\* Sir Stamford Raffles' specimen in the Museum of the Zoological Society, London.

† Specimen in the collection of H. Walker, Esq. Surgeon G. G.

|                          |                |
|--------------------------|----------------|
| Length of the head,..... | 0 ft. 3 inch.  |
| Ditto ditto trunk,.....  | 8      1       |
| Ditto ditto tail,.....   | 2      4       |
|                          | <hr/>          |
|                          | 10 ft. 8 inch. |

Circumference of the neck  $5\frac{2}{8}$ , of the trunk  $8\frac{5}{8}$ , of the tail,  $4\frac{1}{8}$  inch.

The neck is covered by 21, the trunk by 17 longitudinal series of smooth imbricate scales: those of the two lowest series are large rhombic; of the sides irregular rhomboidal, appearing linear, all with rounded apex. The Malayan individuals are of a lighter colour, more inclining to yellow, than those observed in Bengal.

GEN. NAJA, *Laurenti*.

Head covered with shields; muzzle truncated; the anterior part of the trunk, between the 6th and 12th abdominal scutum, considerably dilatable in the shape of a disk, with a large, white, transparent spot above, edged with black, and somewhat resembling a pair of spectacles.

NAJA LUTESCENS,\* *Laurenti*, VAR (D, Daudin.)

SYN.—Seba II. T. 97, F. 4.

*Naja peruviana*, Lacépède.

Russell, I. Pl. 6, Fig. 4, Sankoo Nagoo.

Latreille IV. P. 27.

*Vipera naja*, Var D, Daudin.

*Aspis*, Wagler.

*Naja tripudians*, Var. Gray, Ill. Ind. Zool.

*Naja tripudians*, Merrem, Var. Schlegel.

“*Ular mata-ári*” of the Malays.

Head shining dark brown above; on the sides and lips brownish white; ground colour of the trunk buff, the anterior half of each scale pale greyish brown; beneath buff. Iris black with a narrow light grey margin towards the orbit; tongue light flesh-coloured.

*Young*.—Much lighter brown than the adult and strongly iridescent.

Scuta 189 to 193; Scutella 49 to 54.

\* *Coluber naja*, Linné, *Naja lutescens*, *Laurenti*, the *cobra de Capello*, has probably the widest range of the Asiatic venomous serpents. The species, or its varieties, inhabits the countries between the Sutlej and Cape Comorin, and Ceylon. According to Mr. Hodgson's observations it does not occur in the valley of Nepal, but it ranges through Hindustan down to Cape Romania, the southern extremity of the Malayan Peninsula, and from thence to Chusan, 30° N. E. 122° E. It is also found in the Philippines, Ternate, Borneo, Java, Sumatra.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Bengal, Coromandel.

It is numerous in the Malayan hills and valleys, but apparently of uncommon occurrence in Bengal.

VAR. NIGRA.

SYN.—*Naja tripudians*, Var. *nigra*, Gray, Illustr. Ind. Zool.

*Naja tripudians*, Var. Schlegel.

Upper parts intense black with strong purple or blue reflections; temples, lips, and throat pale orange, largely spotted with black; the lateral part of the anterior eight or ten, and of the 14th, 15th, and 17th scuta pale orange, black in the centre and with a broad black margin; the scales and interstitial skin on each side of the anterior eighteen or twenty scuta white or buff, appearing on the lower surface of the hood as two short parallel bands. The rest of the abdominal surface paler black than above, strongly iridescent, in certain lights pale silvery. Iris black with the orbital margin pale grey; tongue light flesh-coloured.

Scuta 184 to 187; Scutella 49 to 52.

HABIT.—*Pinang, Singapore.*

At Pinang the preceding variety prevails, at Singapore the present. Both are local, and they appear respectively to congregate on single spots of limited extent. Another black variety (*Naja atra*, Cantor) which inhabits Chusan, differs from the present in having a number of distant transversal double lines of a yellow colour. Beneath it is slate- or pearl-coloured.

The food of *Naja lutescens* consists of rats, small birds, (it occasionally ascends trees,) lizards, and fishes, in search of which latter it frequently takes the water, and even the sea, along the coasts. The largest individual of the two Malayan varieties, was of the following dimensions:

|                               |       |                        |
|-------------------------------|-------|------------------------|
| Length of the head, . . . . . | 0 ft. | 1 $\frac{7}{8}$ inch.  |
| Ditto ditto trunk, . . . . .  | 4     | 1                      |
| Ditto ditto tail, . . . . .   | 0     | 9                      |
|                               | <hr/> |                        |
|                               | 4 ft. | 11 $\frac{7}{8}$ inch. |

Circumference of the neck, 2  $\frac{7}{8}$ , of the trunk, 4  $\frac{5}{8}$ , of the root of the tail, 2  $\frac{3}{8}$  inch.



The following Memorandum relative to the venom of *Naja lutescens* (Laurenti) has kindly been communicated by J. W. Laidlay, Esq., Joint Secretary, Asiatic Society.

"The venom was carefully obtained so as to avoid any admixture of saliva, by compressing the venomous glands. It issued from the lower aperture of the fangs in viscid drops of a syrupy consistency, and was received as it fell from the fangs in platina capsules. The serpents operated upon were an adult *Cobra de Capello* (*Naja lutescens*, Laurenti) and one of its *Varieties* (*Naja kaouthia*, apud Belanger) and were supplied by the kindness of J. W. Grant, Esq. C. S."

"In every instance the venom readily changed the blue of litmus to red, and restored the bright yellow to turmeric paper that had been reddened by the application of caustic alkali; an unequivocal proof of acidity. When left to spontaneous evaporation, it dried into a varnish resembling mucilage, or the glare of an egg, cracking in all directions; and on being heated it deposited an abundant coagulum, apparently albuminous. In either instance when redissolved, it retained its acid property."

"What the nature of this acid may be, it was impossible to determine from the small quantity operated upon; nor am I prepared to say that the poison *itself* is an acid, although if it be not so, it is certainly associated with one. Most probably from the rapid and spontaneous disappearance of its properties by keeping, the poison itself consists of some exceedingly unstable compound, which would be wholly disorganised under any attempt at isolation by chemical means."

SUB.-FAM. VIPERINÆ, *Bonaparte*.

GEN. TRIGONOCEPHALUS, *Oppel*.

Head broad triangular, scaly, with a pit before the eyes; trunk robust, cylindrical, tail short, tapering to a point, with scutella beneath.

TRIGONOCEPHALUS GRAMINEUS, (Shaw.)

SYN.—Russell, I. Pl. 9, Bodroo Pam; II. Pl. 20.

*Coluber gramineus*, Shaw.

*Vipera viridis*, Daudin.

*Trimeresurus viridis*, Lacépède.

*Cophias viridis*, Merrem.

*Coluber gramineus*, apud Raffles: Tr. Linn Soc. XIII.

Bodroo Pam, Russel, apud Davy: Ceylon, &c.

*Bothrops*, Wagler.

*Trigonocephalus viridis*, Schlegel.

*Trigonocephalus erythrus*, Cantor, (young.)

"Ular daun" of the Malays.

Grass green above, lighter on the sides, frequently interrupted by zig-zag lines, produced by the black interstitial skin; the tail in some bright cinnamon-red; from the sides of the neck along the lowest series of scales a pale yellow line. Lips, throat and abdominal surface greenish yellow; scutella in some spotted with cinnamon-colour. Iris golden, dotted with brown, but leaving a narrow margin bordering the elliptical black pupil, which is vertically contracted by the light. Tongue pale bluish with black apex.

Scuta 165 to 170; Scutella 58 to 71.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

New-Holland,\* Timor, Pulo Samao, Celebes, Eastern Java, Banka, Sumatra, Tenasserim, Bengal, Chirra Púnji, Nipal† Coromandel, Ceylon.

VAR.

SYN.—*Coluber gramineus*, Var. apud Raffles, l. c.

Differs from the preceding by its Indian or brick-red line on each side.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Sumatra, Tenasserim.

In the Malayan hills and valleys the variety is by far the more numerous: it is indeed the most common of the venomous serpents. In Bengal I never observed but a single young one, (*T. erythrurus*,) captured in the Sunderbuns. It is generally observed on trees, hanging down from the branches, or concealed under the dense foliage; it preys on small birds and tree-frogs [*Polypedates leucomystax*, (Gravenhorst.)] But occasionally it descends to the ground, in search of frogs and toads. The neck is covered by 27, the trunk by 23 or 25 ovate imbricate, keeled scales. The tail is prehensile.

Of a number examined none exceeded the following dimensions:

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | 1 $\frac{4}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 2     | 0                     |
| Ditto ditto tail, . . . . .   | 0     | 5 $\frac{6}{8}$       |
|                               | <hr/> |                       |
|                               | 2 ft. | 7 $\frac{2}{8}$ inch. |

\* Lacépède, on the authority of M. Baudin.

† Specimen in Mr. Hodgson's collection.

Circumference of the neck,  $1\frac{4}{8}$ , of the trunk,  $2\frac{2}{8}$ , of the root of the tail, 1 inch.

TRIGONOCEPHALUS SUMATRANUS, (Raffles\*) VAR. (See pl. XL, Fig. 9.)

SYN.—“Úlar kápak” of the Malays of the Peninsula.

*Young*.—Grass green above, lighter on the sides and lips; from the pit beneath the eye, over the cheek a cinnamon red line with the upper margin buff; on each side of the back a series of distant spots, half cinnamon, half buff coloured, each of the two or three scales composing the spots, being of these two colours; on the tail the spots are confluent, forming transversal lines. Beneath light yellowish green. The largest individual in this garb measured 1 ft.  $3\frac{6}{8}$  inch in length.

*Adult*.—Ground colour above light yellow, or pale greenish yellow, largely mixed with intense dull black, so as to make the general appearance black, through which the ground-colour appears on the head as irregular spots, and a continued line, beneath which a black line proceeds from the eye to the occiput: on the trunk and tail as narrow, distant, transversal bands, continued or broken up into spots. Labials, gulars, the lowest two or three lateral series of scales, and scuta gamboge with black margins; scutella largely spotted with black. Iris golden dotted with black and with a black transversal bar, pupil elliptical, vertically contracted by the light; tongue bluish grey.

Scuta 141 to 147; Scutella 42 to 52.

HABIT.—Pinang, Singapore, Malayan Peninsula.

Unfortunately in the Malayan countries this variety is not of so rare occurrence as the species appears to be in Sumatra. Both are equally dreaded. The natives of Sumatra denominate it “Púchuk,” a young, green shoot of a tree, a name expressive both of its colour and arborial habits. The Malays of the Peninsula, who only know the black variety, call it from its broad cordate head the “hatchet-shaped” serpent, “Kápak,” or “Kápah” signifying an axe. At Pinang it generally occupies the lower parts of the hills or the valleys, either on the ground or on trees, but Dr. Montgomerie in one instance observed it at an elevation of 2,200 feet. It preys upon rats, small birds, tree-frogs and

\* SYN.—Seba, II. T. 68, F. 4.—*Coluber sumatranus*, Raffles, Úlar Poochook.—*Cophias wagleri*, H. Boie.—*Tropidolemus*, Wagler.—*Trigonocephalus wagleri*, Schlegel.

HABIT.—Sumatra.

toads. The neck is covered by 27, the trunk by 23 to 25 longitudinal series of ovate, imbricate keeled scales. The labials, and the gular scales are sharply keeled, but the keels of the former become obliterated with age. The tail is prehensile. Of nine examined the largest individual was of the following dimensions :

|                               |       |                      |
|-------------------------------|-------|----------------------|
| Length of the head, . . . . . | 0 ft. | 2 inch.              |
| Ditto ditto trunk, . . . . .  | 1     | $6\frac{4}{8}$       |
| Ditto ditto tail, . . . . .   | 0     | $6\frac{1}{8}$       |
|                               | <hr/> |                      |
|                               | 2 ft. | $2\frac{5}{8}$ inch. |

Circumference of the neck,  $2\frac{6}{8}$ , of the trunk,  $4\frac{4}{8}$ , of the root of the tail,  $1\frac{6}{8}$  inch.

#### TRIGONOCEPHALUS PUNICEUS, Reinwardt.

SYN.—Seba, II, Tab. 64. Fig. 1.

Klein : Tentam. Pg. 10. No 25.\*

Vipera acontia, Laurenti.

Coluber acontia, Gmelin.

Vipera acontias, Daudin.

Echidna acontia, Merrem.

Trigonocephalus puniceus, Reinwardt.

Atropos, Wagler.

Trigonocephalus purpureomaculatus, Gray, Ill. Ind. Zool.

Trigonocephalus puniceus, Schlegel.

Dull reddish-brown or olive tinged with purple ; in some an indistinct black line from the eye to the sides of the neck ; the scales dotted or finely marbled with black, their keels pale ochre ; the posterior part of the trunk and tail with irregular dark brown spots ; the interstitial skin reddish brown, lighter or darker than the scales ; lips, throat, the three or four lowest series of scales, and beneath pale greenish yellow ; scuta and scutella with brown margins, the latter largely spotted with brown. Iris greenish golden marbled with black ; pupil elliptical vertically contracted by the light ; tongue light brownish grey.

Scuta 162 to 171 ; Scutella 65 to 70.

HABIT.—*Pinang, Malayan Peninsula.*

Singapore, Java.

The malayan individuals differ slightly from the javanese in having very few dark spots and no reddish line above the black one on the

\* As several serpents have by Klein been indicated under the name of *acontias*, the specific name of Reinwardt has been substituted.



sides of the head. The oval gular scales have a tubercular appearance. The integuments of the head and body are remarkably lax, like those of *Aerochordus javanicus*. The neck is covered by 31, the trunk by 27 longitudinal series of ovate or conical scales; they are not imbricate, but are frequently surrounded by the naked skin. The tail is prehensile, but less so than in the preceding species. The malayan individuals appear to be less numerous than the javanese. The four observed were all found on the ground in valleys. The largest, which had been feeding on a rat, was of the following dimensions:

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | 1 $\frac{4}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 2     | 5 $\frac{3}{8}$       |
| Ditto ditto tail, . . . . .   | 0     | 5 $\frac{4}{8}$       |
|                               |       | <hr/>                 |
|                               | 3 ft. | 0 $\frac{3}{8}$ inch. |

Circumference of the neck, 2, of the trunk, 3  $\frac{4}{8}$ , of the root of the tail, 1  $\frac{3}{8}$  inch.

In general sluggish, but when roused, ferocious habits, the preceding three species resemble the genus *Bungarus*; their mode of attack is also similar: like *Vipera russelli*, (Shaw)\* when it prepares to dart, they vibrate the prehensile tail, and utter a faint hissing sound. As the pupil is vertically contracted by the light, they frequently miss their aim, and like *Bungarus*, *Naja*, *Vipera russelli* and *Hydrus*, in the extreme of fury, they will fix the fangs in their own bodies. Although they are averse to motion, they are not of quite so stationary habits as represented by M. Schlegel, (*Essay: Partie Descriptive*, page 520.) In the jungle I have noticed them moving between the branches of trees or on the ground, either in search of prey, or after heavy rains have flooded their hiding places. In Bengal most terrestrial serpents keep the latter during the hot season, but the rains send them abroad in search of dry localities. Although the present genus has venomous organs, as highly developed as *Crotalus* or *Vipera*, the effects produced by wounds of two species at least, appear to be less dangerous, than might *à priori* be supposed. According to Russell's experiments with the venom of *Trigonocephalus gramineus*, chickens expired within 8 to 33 minutes, pigeons in 14 to 18 minutes. A pig recovered in 6 or

\* SYN.—Russell, I. Pl. 7. *Katuka Rekula Poda*, II. Pl. 32.—*Coluber russellii*, Shaw.—*Vipera elegans*, Daudin.

7 hours, a dog in 2 to 3 hours, after having been wounded, (Russell, I. page 60.) Mr. Hodgson has seen a man who was wounded by this species, the only venomous known to inhabit Nepal, fearfully suffering from pain and swelling, but he never heard of a fatal case.—(*Transactions Zoological Society. London. Vol. II, page 309.*)

A male *Trionocephalus puniceus*, successively wounded two fowls, one in the chest, the other in the left thigh. In both cases the fangs of both sides acted, but neither of the birds experienced any other effect except a slight pain, which lasted a few minutes after they had been wounded. It should, however, be observed, that the serpent at the time had gorged itself with food, in which state it was observed close to the General Hospital, in the valley of Pinang. Another individual was subsequently caused to wound a fowl on the inside of the thigh. The bird immediately drew up the wounded leg, fell down and was purged 3 minutes after being wounded. In 3 minutes more, slight spasms of the head and neck appeared at short intervals, but they ceased in 5 minutes, when the fowl made, at first some unsuccessful, attempts to rise. Twenty-one minutes after having been wounded, the bird rose, shook the wings, and had perfectly recovered. The same serpent subsequently was made to wound another fowl on the inside of the left thigh. The bird drew up the wounded leg, and was slightly purged, but showed no other inconvenience from the wound.

The following experiment is communicated by Dr. Montgomerie. An adult *Trionocephalus sumatranus*, *Var.* was made to bite a fowl in the fleshy part of the thigh. The bird limped about for a short time, and a minute after it was wounded commenced purging. At the end of two minutes it fell, breathing laboriously and was strongly convulsed. At the end of six minutes a few drops of water exuded from the eyes; in fifteen seconds more it was quite dead: six minutes and a quarter after it had been wounded. Both fangs had acted, the wound was livid, and similar lines were observed in the course of the absorbents. On another occasion, after some unsuccessful attempts to make another individual bite a fowl, a terrier accidentally was wounded in the fleshy part of the fore-arm. The serpent fixed the fangs for an instant in the flesh; the dog pitifully screaming, jumped and shook it off. A ligature was immediately applied above the elbow, and the dog secured in a cage. It continued for some time whining from pain,

probably aggravated by the tight ligature, which was removed at the close of half an hour, and the dog let free. In a short time it had regained the free use of the limb and was apparently well. But on the third day following a perfectly circular slough, including the bitten spot of about  $\frac{3}{4}$  of an inch in diameter, was thrown off, the sore readily healed up and the dog suffered no further inconvenience.

#### PELAGIC.

#### FAM. HYDRIDÆ, BONAPARTE.

##### GEN. LATICAUDA, *Laurenti*.

Tail compressed, with two surfaces, gradually increasing in height, and with three furrows (sutures) on each side.

##### LATICAUDA SCUTATA, *Laurenti*.

SYN.—*Coluber laticaudatus*, Linné. Mus. A. Fig. 1754.

*Laticauda imbricata*, *Laurenti*? 1768.

Le serpent large-queue, Daubenton, 1784.

*Coluber laticaudatus*, apud Thunberg, 1787.

*Coluber laticaudatus*, apud Gmelin, and E. W. Gray, 1789.

La queue plate, Lacépède, 1801.

*Hydrus colubrinus*, Schneider, 1801.

*Platurus fasciatus*, Latreille, 1802.

*Hydrus colubrinus*, apud Shaw, 1802.

*Platurus fasciatus*, Daudin, 1803.

*Aipysurus lævis*, Lacépède, 1804, (Var?)

*Platurus semifasciatus*, Reinwardt, M. S.

*Platurus fasciatus*, apud Wagler, 1830.

*Hydrophis colubrina*, Temminck and Schlegel, Fauna Japonica, Tab. 10.

*Hydrophis colubrina*, Schlegel, 1837.

*New born*.—Ground colour gamboge, greenish above, with numerous distant broad rings of a blue reflecting black colour, encircling the body; the first and second black mark of the head and neck are beneath joined by a short longitudinal line, commencing on the lower labial shields; another shorter black line borders above the gamboge upper labials; the scales between the rings, the scuta and scutella with blackish margins.

*Older*.—Of paler colours, lead-grey on the back; the rings impure light blue on the sides and abdomen. The scales and scuta without blackish margins. Iris black, pupil circular; tongue grey.

Scuta 227 to 246; Scutella 32 to 41.

HABIT.—*Sea of the Malayan Peninsula and Islands.*

Bay of Bengal (Ramree, Pondicherry, Nicobars), Sea of Timor, Molucca and Liewkiew Islands, Celebes, New Guinea, Tongataboo, China Sea.

This species is readily identified by the abdominal scuta, and the scutellated very broad tail. The anterior frontals are separated by a small elongated pentagonal, or rhombic, shield, bordered behind by the vertical, which is proportionally the largest shield, either equaling or exceeding each of the occipitals. The eyes are comparatively large and prominent, surrounded by two post-orbitals, one præ-orbital, and beneath, by the third and fourth of the seven large upper labials. The lower jaw is covered in front by the rostral and the two first labials, the succeeding seven are elongated linear and placed horizontally so as to be hid by the upper labials, when the mouth is closed. The chin is covered by two pairs of pentagonal shields, between which and the labials appear two or three series of elongated scales. The neck is covered by 25, the anterior part of the trunk by 23, increasing to 25 and again decreasing to 19 longitudinal series of large, smooth scales. The nostrils are small, opening laterally. The tail, though much compressed, presents a broad flat surface beneath, till near the apex, where it becomes two-edged. The largest individual examined was of the following dimensions :

|                          |       |                       |
|--------------------------|-------|-----------------------|
| Length of the head,..... | 0 ft. | 1 inch.               |
| Ditto ditto trunk,.....  | 3     | 2                     |
| Ditto ditto tail,.....   | 0     | 5 $\frac{3}{8}$       |
|                          | <hr/> |                       |
|                          | 3 ft. | 8 $\frac{3}{8}$ inch. |

Circumference of the neck, 1 $\frac{7}{8}$ , greatest do of the trunk, 4 inch.

#### GEN. HYDRUS, *Schneider*.

Body slender in front, gradually thickening, covered with scales ; tail compressed, two-edged.

#### HYDRUS STRIATUS, (Lacépède.)

SYN.\*—*Leioselasma striata*, Lacépède, 1804.

*Hydrophis striata*, Temminck and Schlegel: Fauna Japon. Pl. 7.

*Hydrophis striata*, Schlegel: Essay, 1837.

*Hydrophis striata*, Schlegel, apud Cantor, Tr. Zool. Soc. London, Vol. II.

\* DOUBTFUL SYNONYMY.—*Russell*, II. Pl. 9, *Chittul*, 1801, agrees with this species in the following characters: the eyes high, small, orbicular; the trunk round till near the anus, where it becomes compressed; the scales smooth, imbricate, orbicular on the sides; the central abdominal series much larger than in any of the other species, (*Russell*.) The difference of colours is unimportant, as it is liable to variations, not only individually but according to age. Besides, all the species acquire a light bluish appearance about



*Adult ?*—Crown shields light chestnut ; lips and throat pale yellow ; ground colour above pale greenish yellow, sides and abdomen buff with numerous distant black transversal bands, becoming indistinct towards the tail and on the sides, where the scales are partially edged or spotted with black. The interstitial skin of the back and sides black, of the abdomen buff. Iris dark grey with a buff orbital margin ; pupil black minute ; tongue buff.

Central abdominal series of larger scales, 347 + 41.

**HABIT.**—*Sea of Pinang and Malayan Peninsula.*

Sea of Liewkiew Islands, Timor, Sumatra, Bay of Bengal.

The eyes are lateral, sunk, excessively small, of a diameter equalling the large almost vertically opening nostrils. The single præ-orbital shield is beneath wedged in between the second and third upper labial. The latter, as well as the fourth and fifth, border the orbit beneath. Of the two post-orbitals the lower is wedged in between the fifth upper labial and the large shield resting upon the sixth upper labial. Above the latter and the seventh, the cheeks are covered by three very large shields. The seven upper labials are large and very high. Of the nine inferior labials the two anterior are the largest, and placed vertically, the succeeding seven are smaller and placed nearly horizontally, so as to become partially hid when the jaws are closed. The chin is covered by the first pair of labials and two pairs of elongated mentals, between which and the inferior labials intervene on each side the second labial, three very large shields, and three smaller. The neck is covered by 37, the anterior part of the trunk by 33, and the thickest by 40 longitudinal series of rhombic scales. In the individuals examined by M. Schlegel, all of less length than my own, the series varied from 31, 29 to 27. The scales are rhombic with rounded apex, each scale with a small central tubercle, or an elevated (keeled) line, which however with age becomes indistinct or obliterated. The central larger

the period when the integuments are to be changed. Russell's description was copied by Daudin, who merely supplied the denomination of *Hydrophis cyanocinctus*, (*Hydrus brugmansii*, Boie, 1827,) upon which Wagler founded his genus *Enhydris*, 1830. According to M. Schlegel, all these are Synonymes of *Hydrus nigrocinctus* (Daudin). The only means of deciding the Synonymy of this and most of the other species appears to be a close examination of such original specimens, described by Russell and Shaw, which may at present exist in the collection of the British Museum.

abdominal scales are hexagonal, with or without a small tubercle on each side. The anus is covered by three or four excessively large scales. The larger individual of two was of the following dimensions:

|                           |       |                      |
|---------------------------|-------|----------------------|
| Length of the head, ..... | 0 ft. | $1\frac{5}{8}$ inch. |
| Ditto ditto trunk, .....  | 5     | $6\frac{3}{8}$       |
| Ditto ditto tail, .....   | 0     | $4\frac{6}{8}$       |
|                           | <hr/> |                      |
|                           | 6 ft. | $0\frac{6}{8}$ inch. |

Circumference of the neck,  $3\frac{3}{8}$ , greatest do. of the trunk,  $4\frac{2}{8}$  inch.

### HYDRUS NIGROCINCTUS, (Daudin.)

SYN.\*—Russell, II. Pl. 6. Kerril Pattee, 1801.

Hydrophis nigrocinctus, Daudin, 1803.

Hydrophis melanurus, Wagler, 1828.

Polyodontes annulatus, Lesson, 1833.

Hydrophis nigrocincta, Schlegel, 1837.

Hydrophis nigrocincta, Schlegel, apud Cantor, l. c.

*New born*.—Ground colour buff or bluish-white; upper-lips and muzzle black, and a transversal band across the hind head, from whence proceeds a triangular or cross mark towards the vertex; gular and inferior labial shields edged and spotted with black; trunk and tail with numerous black transversal bands, either encircling the body, or interrupted on the abdominal ridge, where appear a few indistinct black spots; apex of the tail black. Entire length  $8\frac{4}{8}$  inch.

*Older*.—Greyish green olive above, yellowish on the sides, buff beneath; the bands less intense black, often placed obliquely so as to join each other on the back. Iris grey; pupil circular, black; tongue buff. Central abdominal series of larger scales,  $281+41$ ;  $284+43$ ;  $289+39$ .

HABIT.—*Sea of Malayan Peninsula, Pinang, Singapore.*

Estuaries of the Ganges, Bay of Bengal.

This species greatly resembles *H. striatus*, from which it differs in the more compressed general form; the eye though small, is of a larger diameter than the nostril, and it is surrounded by a single post-orbital shield, which beneath is wedged in between the fourth and fifth upper labial, and the præ-orbital between the second and third. The orbit is bordered beneath almost entirely by the fourth upper labial. The

\* DOUBTFUL SYN.—Russell, II. Pl. 13, *Kuddell Nagam*, 1801. (*Enhydrys gracilis*, Merrem, 1820.) *Hydrus spiralis*, Shaw, 1802.

sixth upper labial is the largest, in some individuals covering the cheek and bordering above the occipital. Of the seven or eight inferior labials the four anterior are very large; above the third there is one or two small triangular shields; the other three or four posterior labials are very small elongated. There is no horizontal series of labials as in *H. striatus*, and the two elongated pairs of mentals immediately border the labials. The neck is covered by 33, the thickest part of the trunk by 53 longitudinal series of scales. Those examined by M. Schlegel, the length of which exceeds those come under my own observation, had 27, 29 to 31 series of scales. Those of the anterior part of the back are rhomboidal, those of the posterior part rhombic with rounded apex and slightly imbricate; those of the sides hexagonal: all have either a sharply raised keel or a central tubercle, both of which frequently become obliterated. The central series of abdominal scales are a little larger than the rest, frequently divided in two hexagonal, and with a small tubercle on each side, which often becomes indistinct, or obliterated. The anus is covered by 3 or 4 very large, or by a series of small scales. The largest of six individuals was of the following dimensions:

|                           |       |                       |
|---------------------------|-------|-----------------------|
| Length of the head, ..... | 0 ft. | 0 $\frac{6}{8}$ inch. |
| Ditto ditto trunk, .....  | 2     | 0 $\frac{2}{8}$       |
| Ditto ditto tail, .....   | 0     | 2 $\frac{6}{8}$       |
|                           | <hr/> |                       |
|                           | 2 ft. | 3 $\frac{6}{8}$ inch. |

Circumference of the neck,  $\frac{6}{8}$ ; greatest do. of the trunk, 2 inch.

VAR. ? (See Pl. XL. Fig. 8.)

Crown shields olive green with a blackish band from the eyes over the anterior part of the upper lip; the posterior part and the lower lip pale yellow; ground colour of the trunk greenish lead grey above, pale yellow on the sides, beneath buff, with numerous black transversal bands. Iris amber-coloured with the orbital margin dark grey. Central abdominal series of scales 235 + 38.

It differs from the preceding in the following particulars. The head is proportionally shorter, broader triangular, the muzzle more pointed, and the upper surface from the vertical shield very declivous. The eyes are much larger than the nostrils, with a single præ- and post-orbital, but bordered beneath by the third and fourth upper labial.

The latter, six in number, present nothing abnormal. The lower labials are also six, proportionally larger than in the preceding. The mouth is smaller. The make of the trunk is more robust; the neck is covered by 15, the thickest part of the body by 21 longitudinal series of proportionally much broader hexagonal scales, tuberculated on the anterior part of the trunk, on the rest keeled, forming series of sharp, continued ridges. The central abdominal series is at first somewhat larger than the rest, angular, with a small more or less distinct tubercle on each side. A single individual, captured in a fishing stake off Pinang, was of the following dimensions:—

|                           |       |                       |
|---------------------------|-------|-----------------------|
| Length of the head, ..... | 0 ft. | 0 $\frac{6}{8}$ inch. |
| Ditto ditto trunk, .....  | 1     | 6 $\frac{2}{8}$       |
| Ditto ditto tail, .....   | 0     | 2 $\frac{4}{8}$       |
|                           |       | <hr/>                 |
|                           | 1 ft. | 9 $\frac{4}{8}$ inch. |

Circumference of the neck, 1 $\frac{3}{8}$ , greatest do. of the trunk, 2 $\frac{1}{8}$  inch.

#### HYDRUS GRACILIS, Shaw.

SYN.\*—Russell, I, Pl. 44, Tatta Pam, 1796, (very young.)

Hydrus fasciatus, apud Shaw (Russell, I, 44, excluding the other *Syn.*) 1802.

Angvis mamillaris, Daudin, 1803.

Hydrus, apud Wagler, 1830.

Russell, II, Pl. 7, Shootur Sun, 1801.

Hydrus cloris, Daudin, 1803.

Hydrophis, apud Wagler, 1830.

Russell, II, Pl. 8, Kalla Shootur Sun, 1801.

Hydrophis obscurus, Daudin, 1803.

Hydrophis, apud Wagler, 1830.

Hydrus fasciatus, apud Guérin: Iconog. Rept. Pl. 25, 1, 1829.

Pelamis chloris, Merrem apud Horsfield: Life of Raffles, 1830.

Microcephalus gracilis, Lesson, 1833.

Hydrophis gracilis, Schlegel (*Syn.* Angvis xiphura, Hermann, Typhlops, Merr. Tent. p. 158,) 1837.

Hydrophis gracilis, Schlegel, apud Cantor, l. c. Pl. 56, (Young.)

*New born*.—Head shining intense black; ground colour of the trunk and tail bright gamboge, on the back and sides interrupted by numerous black rings, which above are widened into lozenge shape, narrowed on the sides. Throat and anterior half of abdomen intense black, continued as a more or less distinct line to the black apex of the tail. On the sides the yellow ground colour appears in the shape of oval spots,

\* DOUBTFUL SYN.—*Angvis laticauda*, Linné, Mus. A. F. 1754. Vosmaer, Monogr. Fig. 2, 1774, *Hydrus fasciatus*, Schneider, 1801.



gradually increasing in depth towards the tail. Entire length, 1 ft. 3 inch.

*Adult?*—Head and back uniformly dark olive or brown, becoming greyish on the posterior half, and very indistinct or obliterated on the sides. In some a pale yellow spot on each side of the hindhead, and a third on the frontal shields. The lateral oval spots pale sulphur coloured on the anterior half, pale greenish yellow on the posterior. The black of the lower surface very pale, but distinct. Iris black; tongue buff.

Central abdominal series of larger scales, 45+60.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Bay of Bengal, Malabar, Sumatra, Borneo.

In form and number the shields of the head resemble those of *Hydrus nigrocinctus*, so as to afford no distinguishing character. Yet it may be readily distinguished from that and other species by the excessive slenderness of the anterior, cylindrical part of the trunk, which from thence becomes much compressed, gradually increasing in bulk and vertical diameter till towards the tail, where the diameter again decreases. The scales of the cylindrical, anterior part of the trunk are rhomboidal with rounded points and slightly imbricate; the rest are hexagonal. The central abdominal series continued beneath the tail, consists of hexagonal scales, a little larger than the rest, and frequently longitudinally divided. In the very young all the scales are smooth, with age the central abdominal ones acquire a small tubercle on each side, and those of the compressed sides and of the back each a central tubercle. In the largest individuals the central abdominal scales have three longitudinally placed minute tubercles on each side, and the rest of the hexagonal scales three or four similar central tubercles. In the new-born the neck is covered by 32, the bulkiest part of the body by 49 longitudinal series; these parts are covered by 26 and 44 series in the largest individual, which is of the following dimensions:

|                               |       |                       |
|-------------------------------|-------|-----------------------|
| Length of the head, . . . . . | 0 ft. | 0 $\frac{5}{8}$ inch. |
| Ditto ditto trunk, . . . . .  | 3     | 2 $\frac{5}{8}$       |
| Ditto ditto tail, . . . . .   | 0     | 4                     |
|                               | <hr/> |                       |
|                               | 3 ft. | 7 $\frac{2}{8}$ inch. |

Circumference of the neck, 1 $\frac{2}{8}$ , of greatest do. of the trunk, 3 $\frac{6}{8}$  inch.

## HYDRUS SCHISTOSUS, (Daudin.)

SYN.\*—Russell, II, Pl. 10, Hoogli Pattee, 1801.

Russell, II, Pl. 11, Valakadyen, 1801.

Hydrophis schistosus, Daudin, 1803.

Hydrus valakadyen, H. Boie, 1827.

Disteira russelli, Fitzinger, 1827.

Hydrophis, apud Wagler, 1830.

Leioselasma schistosa, Fitzinger, 1827.

Hydrus, apud Wagler, 1830.

Hydrophis schistosa, Schlegel, 1837.

Hydrophis schistosa, Schlegel, apud Cantor, l. c.

*New born.*—Head above blackish or dark brown; back and sides with numerous transversal blackish bands, broad above, narrow on the sides; lips, throat, sides and abdomen buff; tail blackish with a few transversal buff bands above. Entire length  $10\frac{3}{8}$  inch.

*Adult?*—Head above and back either uniformly pale greenish grey, or with darker transversal bands, becoming more or less indistinct on the sides; lips, throat, sides brownish white or buff; tail uniformly blackish, or greyish olive-green. Iris pale amber or greenish-yellow, with a grey orbital margin; pupil black, tongue buff.

Central abdominal series:  $239+47$ ;  $242+42$ ;  $312+58$ .

HABIT.—*Sea of Malayan Peninsula and Islands.*

Bay of Bengal, Malabar, Sumatra.

The head is elongated conical, the muzzle sloping and the rostral shield beneath terminating in a vertically projecting point, which fits into a corresponding cavity in the lower jaw. The anterior elongated triangular frontal shields are next to the occipitals the largest; the large oval nostrils send a slit towards the external margin of the shield. The eyes are lateral, moderate, surrounded by a præ-orbital, a post-orbital, frequently cut in two smaller, and beneath by the fourth upper labial shield. Behind the latter, the lip is covered by three or four horizontally placed small shields, above which appear three large vertically placed shields, of which the last borders the sides of the occipital pair. The lower rostral is remarkably elongated, linear, and hid in a furrow between the first pair of inferior labials. Of the latter the anterior five on each side are much elongated, followed by five or six smaller. The chin is covered with numerous minute scales, and like

\* DOUBTFUL SYN.—*Hydrus major*, Shaw, 1802.—*Disteira doliata*, Lacépède, 1804.

the rest of the body with very lax skin. In the young ones the neck is covered by 47, the bulkiest part of the body by 57 longitudinal series of smooth, somewhat tubercular scales. Older individuals have these parts covered by 48 and 60 series of hexagonal scales, either with a short keel dividing the anterior half, or a central tubercle. The central, slightly raised, abdominal series commences very far back, from one to three inches behind the chin. The anterior scales are wedge-shaped hexagonal, the posterior are broader, but slightly larger, than the rest, with a small elongated tubercle on each side. The largest individual of a great number, was of the following dimensions :

|                               |                  |
|-------------------------------|------------------|
| Length of the head, . . . . . | 0 ft. 1 inch.    |
| Ditto ditto trunk, . . . . .  | 3 $1\frac{4}{8}$ |
| Ditto ditto tail, . . . . .   | 0 $4\frac{4}{8}$ |
|                               | <hr/>            |
|                               | 3 ft. 7 inch. .  |

Circumference of the neck,  $2\frac{3}{8}$ , greatest do. of the trunk, 5 inch.

#### HYDRUS PELAMIDOIDES, (Schlegel.)

SYN.\*—*Pelamis carinata*, Cuvier, MS.

*Hydrophis* (*Disteira doliata*, Lacép.) Wagler, 1830.

*Lapemis hardwickii*, Gray, Ill. Ind. Zool. 1832.

*Hydrophis pelamoides*, Schlegel, 1837.

*Hydrophis pelamoides*, Temminck and Schlegel, Fauna Japon. Tab. 9.

*Hydrophis pelamoides*, Schlegel, apud Cantor, l. c.

*Young*.—Sulphur coloured, paler on the sides and abdomen ; the head largely spotted with blackish, through which the ground colour appears in the form of a rectangle, the two sides of which pass from the hind-head to the orbit, the anterior across the frontals, the posterior over the hind-head ; two yellow spots between the nostrils ; lips yellow, cheeks and throat blackish ; on the back a number of transversal blackish bands to the middle of the sides, broader than the intervening yellow lines ; tail black. Entire length  $10\frac{1}{8}$  inch.

*Adult*?—Head uniformly reddish brown above ; ground colour greenish yellow, lighter on the sides and beneath, with broad lozenge shaped transversal bands of a blackish olive, continued on the anterior half of the tail ; posterior half blackish. Iris dark olive ; pupil black ; tongue buff.

\* DOUBTFUL SYN.—Russell, 11, Pl. 12, Shiddil, 1801.—*Hydrus curtus*, Shaw, 1802.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Bay of Bengal, Sea of Celebes, Molucca Islands, China Sea.

The head is much depressed, not broader than the neck; the muzzle broad, rounded; the rostral shield is large, rectangular pentagonal, broader than high, the lower margin with a central point and a notch on each side. The eyes are moderate, lateral, not prominent, surrounded by a præ-orbital, a post-orbital, and beneath by the third and fourth upper labials. The frenal shield, observed by M. Schlegel, was not present in four individuals, examined in the straits of Malacca: its existence therefore appears not to be constant: in all *Hydri* the shields of the head are liable to considerable individual variations of form. Of the eight upper labials the posterior three are very small, which is also the case with the posterior five of the nine inferior labials. The two pairs of elongated mentals are outside bordered by the three first inferior labials, inside, by several small scales. In the young the neck is covered by 37, the thickest part of the trunk by 40 longitudinal series of hexagonal, smooth, comparatively small scales. In the older individual these parts are covered by 32, and 37 large hexagonal scales, each with a central tubercle. The lower series of the sides are slightly larger than the rest, and vertically elongated, so as to acquire a rectangular appearance. The central abdominal series is much smaller than the rest. Each scale is either rhombic, and, as represented in the excellent plates of *Fauna Japonica*, hemmed in between four\* of the two lowest lateral series, or they are absent, and their place is occupied by a pair of the former, which are soldered together. In young individuals the central series frequently consists of alternate broad triangular, and very minute rectangular scales, both kinds smaller than the rest. The largest individual of four was of the following dimensions:

|                          |       |                        |
|--------------------------|-------|------------------------|
| Length of the head,..... | 0 ft. | 1 inch.                |
| Ditto ditto trunk,.....  | 1     | 8                      |
| Ditto ditto tail,.....   | 0     | 2 $\frac{1}{8}$        |
|                          | <hr/> |                        |
|                          | 1 ft. | 11 $\frac{1}{8}$ inch. |

Circumference of the neck, 2 $\frac{1}{8}$ , greatest do. of the trunk, 4 inch.

\* A somewhat similar disposition is observed in the central dorsal series of the however differently shaped scales of *Xenodermus javanicus*, Reinhardt.



## HYDRUS BICOLOR, Schneider.

SYN.—Seba, II, Tab. 77, Fig. 1.

Angvis platura,\* Linné, 1766.

Vosmaer: Monogr. Fig. 1. 1774.

Angvis platurus, apud Gmelin, 1788.

Russell, I, Pl. 41. Nalla Wahlagillee Pam. 1799.

Lacépède V, Tab. 15, Fig. 2, 1801.

Hydrus bicolor, Schneider, 1801.

Hydrophis platurus, Latreille, 1802.

Hydrus bicolor, apud Shaw, 1802.

Pelamis bicolor, Daudin 1803.

Pelamys (Angvis platura, Lin.) Wagler, 1830.

Pelamis bicolor, apud Horsfield, Life of Raffles, 1830.

Pelamis bicolor, apud Oken, 1836.

Hydrophis pelamis, Schlegel, 1837.

Hydrophis pelamis, Temminck and Schlegel, Fauna Japonica, page 60.

Head and back black (inky), forming a straight line on the sides till towards the posterior part, where it becomes largely undulating, so as to appear as broad bands; lips, throat and sides sulphur coloured, turning into yellowish white or buff on the abdomen† and tail; posterior parts of the sides with some more or less distinct rounded black spots; tail largely banded or spotted with black. Iris pale yellow with a broad black orbital margin; pupil black; tongue buff.

HABIT.—*Sea of Malayan Peninsula.*

Bay of Bengal, Malabar, Sea of Sumatra, Java, Celebes,

Molucca Islands, China Sea (to 27° N. Lat.) Otaheite,

Bay of Port Jackson (33° 55' S. Lat.—151° 25' E. Long.)

The head is very elongated, depressed, viewed from above, it presents a striking resemblance to *Herpetodryas oxycephalus* (Reinwardt). The eye is larger than in any other species of *Hydrus*, surrounded by two, three, or even four post-orbitals, one large præ-orbital, and beneath, by the fourth upper labial shield. A frenal shield has been observed in some individuals, but it was absent in that examined in the straits of Malacca, nor does it exist in the specimens, in the Museum of the Asiatic Society. The neck is covered by 44, the thickest part of the trunk by 52 longitudinal series of small scales. Those of the upper parts are smooth, hexagonal; those of the sides approach the orbicular form, and have in the centre one, two or three longitudinally placed

\* In consequence of the specific name of Linné having been applied by Latreille to a genus (*Platurus*), that of Schneider, the next different in succession, has been substituted.

† In the individual figured by Russell, the bright yellow colour formed a narrow lateral line, below which the sides and abdomen were of a dusky greenish yellow.

minute tubercles. Similar tubercles are observed on each side of the scales, forming the central abdominal series, which is composed either of entire hexagonal scales, a little larger than the rest, or they are longitudinally divided into pairs of smaller pentagonal scales, which have the appearance of being divided by an abdominal suture. A single individual taken in a fishing stake, off the coast of Province Wellesley was of the following dimensions :

|                           |       |                      |
|---------------------------|-------|----------------------|
| Length of the head, ..... | 0 ft. | $1\frac{5}{8}$ inch. |
| Ditto ditto trunk, .....  | 2     | $1\frac{7}{8}$       |
| Ditto ditto tail, .....   | 0     | $3\frac{6}{8}$       |
|                           |       | <hr/>                |
|                           | 2 ft. | $7\frac{2}{8}$ inch. |

Circumference of the neck,  $2\frac{1}{8}$ , greatest do. of the trunk,  $3\frac{2}{8}$  inch.

The preceding, comprising all the hitherto known species of pelagic serpents were observed chiefly at Pinang, among the abundant supply of fishes, daily carried to the markets. Of their general habits some account appears in the *Transactions of the Zoological Society, London, Vol. II, p. 303.* One of them, *Hydrus schistosus*, is incredibly numerous in the Bay of Bengal, at Pinang and Singapore, far more so than any known terrestrial serpent. The fishing nets are hardly ever worked, but that one or more are among the contents. The other six species are of rare occurrence at Pinang and Singapore, as will be perceived from the disproportionally small number of each, examined during four years, viz. of *Laticauda scutata* : 3 ; *Hydrus striatus* : 2 ; *nigrocinctus* : 6 ; *gracilis* : 7 ; *pelamidoides* : 4 ; *pelamis* : 1.—Of these *Laticauda scutata* is excessively numerous in Timor, *Hydrus pelamis* in New Guinea, the Molucca Islands, and Otaheite, where the natives use it as an article of food. The remaining species, as far as is known, have been observed nowhere in such overwhelming numbers. Large individuals of every species are very seldom seen, it is the young individuals which frequent the coasts, and it appears to be questionable, if even the largest observed are animals arrived at their full size. The large individuals are very ferocious ; the young ones are less so. Fortunately for the fishermen the light blinds these serpents, which when out of their proper element, become very sluggish and soon expire. This accounts for the safety of the class of men, whose daily calling brings

them in immediate contact with animals, the wound of which is fatal. The fishermen in the straits of Malacca are aware of their danger, and therefore take care to avoid or destroy these reptiles while landing the fishes. The Malays denominate them "*Ular laut*," i. e. serpents of the sea, among which, however, the innocuous *Acrochordus granulatus*, (Schneider) is also comprised as an inhabitant of the coasts.

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## BATRACHIA.

### FAM. CÆCILIDÆ, BONAPARTE.

#### GEN. ICHTHYOPHIS, Fitzinger, 1826.

(*Epicrium*, Wagler, 1828.)

Head depressed, elongated; muzzle obtuse; maxillary and palatine teeth slender, pointed and couched backwards; tongue entire with velvety surface; eyes distinct, below and a little in front of which a fosset with a minutely tentaculated border; body subfusiform with numerous close circular folds.

#### ICHTHYOPHIS GLUTINOSUS (Linné) VAR?

Of a uniform sooty brown, paler on the lower surface. Circular folds 254, of which 8 are caudal.

HABIT.—*Singapore*.

The transversal diameter, taken at the occiput, is nearly equal to that of the root of the tail, and but little less than the uniform diameter of the trunk, which is between the 24th and 25th part of the entire length. Compared with a specimen of *Ichthyophis glutinosus*, (Linné,) the present is of a more robust make; the head is shorter, the muzzle blunter, and the transversal distance between the nostrils greater. The apex of the tongue and the arches formed by the teeth are broader, more rounded. The palatal and upper maxillary teeth are blunter, and appear less recurved. Those of the lower jaw, the largest, present an appearance as if each was composed of two distinct parts: a lower which is vertical, broadly triangular, the posterior margin of which supports the upper part, which is curved backwards, and with rounded apex. The circular folds of the skin are fewer, more distant, and with the exception of the 3 or 4 anterior ones, complete. They are dis-

posed in a manner similar to that of *Ichthyophis glutinosus*. The crowded imbricate scales appear to be of a somewhat rectangular form, less rounded than in *I. glutinosus*: in both their surface presents a minute net-work. The fosset of the upper lip is situated in the centre of a small tubercle. The circumference of the fosset is provided with a very short, minute, membranous tube, which, however, after the animal for some years has been preserved in spirits of wine, can scarcely any longer be distinguished.

|                           |                      |
|---------------------------|----------------------|
| Length of the head, ..... | $0\frac{3}{8}$ inch. |
| Ditto ditto trunk, .....  | $10\frac{1}{8}$      |
| Ditto ditto tail, .....   | $0\frac{2}{8}$       |

---

Entire length, . . .  $10\frac{6}{8}$  inch.

Circumference of the neck, 1, of the trunk,  $1\frac{2}{8}$ , of the root of the tail,  $\frac{5}{8}$  inch.

A single individual was observed by Dr. Montgomerie at Singapore in 1843, in whose garden it was turned up with the earth, from about two feet below the surface, and from whom I received the specimen, shortly after it had been killed. Although, as stated, it differs in colours and in other characters from the description given by M. M. Duméril and Bibron of *Ichthyophis glutinosus* (*Epicrium glutinosum*, Wagler, apud D. and B.) as well as from a specimen  $10\frac{2}{8}$  inch in length, from Assam, the data appear to me insufficient with certainty to determine, whether the present is a distinct species, or a variety of *Ichthyophis glutinosus*, (Linné.)

#### FAM. RANIDÆ, BONAPARTE.

##### GEN. RANA, Linné.

Skin smooth, hinder extremities very long, formed for leaping; toes palmated; teeth in the upper jaw, and in the palate.

##### RANA LESCHENAUTI, Dum. and Bibr.

A line of minute conical tubercles along the sides of the body and across the throat. Above uniformly chocolate-coloured; beneath and on the innerside of the extremities white, more or less vermiculated with pale brown. Iris narrow golden, rhomboidal, the two lower sides not joining each other, but leaving a small open space between them. Web of the toes orange with purple spots.



HABIT.—*Malayan Peninsula.*

Pondicherry, Bengal.

The marbled appearance of the upper parts, described by M. M. Duméril and Bibron, does not exist during life, but is acquired when the frog is immersed in alcohol. The species is apparently not numerous. Of two the larger was of the following dimensions :

|                                           |                      |
|-------------------------------------------|----------------------|
| Length of the head, . . . . .             | $0\frac{7}{8}$ inch. |
| Ditto ditto trunk, . . . . .              | $1\frac{6}{8}$       |
| Ditto ditto anterior extremity, . . . . . | $1\frac{4}{8}$       |
| Ditto ditto posterior, . . . . .          | $3\frac{5}{8}$       |

*Rana bengalensis*, Gray, *Illustr. Ind. Zool.* is perhaps intended to represent this species.

#### RANA TIGRINA, Daudin.

SYN.—*Rana tigrina*, Daudin. *Hist. nat. Gren. &c.* p. 64, Pl. 20.

*Rana mugiens*, Daudin. *l. c.* Pl. 23.

*Rana mugiens*, Latreille. *Hist. Rept. F. 2*, p. 153, Fig. 2.

*La grenouille taureau*, Cuvier, *R. A.*, 1. Ed.

*Rana tigrina*, Merrem.

*Rana limnocharis*, Boie, MS.

*Rana cancrivora*, Boie, MS.

*Rana cancrivora*, Gravenhorst.

*Rana picta*, Gravenhorst.

*Rana brama*, Lesson.

*Rana rugulosa*, Wiegmann.

*Rana vittigera*, Wiegmann.

*Rana cancrivora*, Tschudi.

*Rana tigrina*, apud Duméril and Bibron.

"Kodók, Kátak, Lancha" of the Malays.

Body and limbs above golden greyish-olive or brown, in some with large rounded black spots, and with a yellow line from the muzzle down the back, and a similar broad band from the side of the muzzle to the loins. Beneath and on the innerside of the limbs white or yellow, with or without black spots. Iris burnished golden, the lower half sometimes black, pupil elliptical rhombic.

HABIT.—*Malayan Peninsula and Islands.*

Coromandel, Bengal, Assam, Tenasserim, Java, Sumatra, Timor, Philippines, Canton Province.

The species is excessively numerous in valleys and hills, after heavy falls of rain, but adult individuals are of comparatively rare occurrence

At night the deep short baying sound denotes its presence. The largest individual measured :

|                                             |                       |
|---------------------------------------------|-----------------------|
| Length of the head, . . . . .               | 1 $\frac{1}{8}$ inch. |
| Ditto ditto trunk, . . . . .                | 3 $\frac{1}{8}$       |
| Ditto ditto anterior extremities, . . . . . | 2 $\frac{1}{8}$       |
| Ditto ditto posterior, . . . . .            | 7 $\frac{1}{8}$       |

GEN. MEGALOPHRYS, *Kuhl.*

Head very large, broader than the trunk, depressed ; rostral angle and upper eyelid elongated to a point. Tympanic membrane hidden. Nostrils lateral, below the rostral angle. Mouth enormous ; tongue circular, slightly notched behind. Posterior extremity with a short interdigital membrane.

MEGALOPHRYS MONTANA, Wagler, VAR.

Above pale greyish brown, with a small black triangular tubercle on each shoulder, and a similar in the centre of the sacrum. From the sides of the muzzle a black band edged with white, continued round the orbit, and then downwards, obliquely over the dark brown cheeks. Outside of the limbs indistinctly marked with black. On the elbows, knees and heels a large round black spot. Posterior margin of the limbs rose-coloured. Fingers and toes yellowish white with transverse black bands. Palms and soles black. Throat and chest sooty with a large white blotch on each side of the latter. Abdomen and innerside of the limbs sooty, vermiculated and spotted with white. Iris rich golden brown, with minute black net-work. Pupil vertically rhomboidal.

HABIT.—*Pinang.*

Wagler's short description of *M. montana* is drawn up from a preserved specimen, which apparently is also the case with that communicated in *Erpétologie Générale*. From the latter the present animal differs both in colours and in the following particulars. The muzzle forms a pointed lobe resembling the upper eyelids, but smaller. The nostrils are transversely oval, protected by a membranous valve fixed to their lower margin. The upper eyelids are perfectly smooth. The nearly vertical cheeks are above bordered by an angular ridge terminating near the shoulder ; behind by a short curved ridge, which at the angle of the mouth forms a small pointed lobe. The back is smooth without transversal folds, but bordered on each side by a sharp whitish ridge commencing at the upper eyelid, converging towards the

cloacal orifice. On the shoulder, near the triangular tubercle, the ridge is enclosed between two short black lines.

Two males were at different times captured on the Pentland Hills, at an elevation of about 1800 ft. One was found in a dark room, where it was observed remaining motionless during several successive days. Its forms and colours caused it at first to be mistaken for a withered leaf. The second was taken on a tree. The iris is vertically contracted by exposure to the light. The male has no vocal sacs. The larger was of the following dimensions:

|                                             |                       |
|---------------------------------------------|-----------------------|
| Length of the head, . . . . .               | 0 $\frac{7}{8}$ inch. |
| Ditto ditto trunk, . . . . .                | 1 $\frac{7}{8}$       |
| Ditto ditto anterior extremities, . . . . . | 2                     |
| Ditto ditto posterior, . . . . .            | 3 $\frac{2}{8}$       |

#### FAM. HYLIDÆ.

##### GEN. LIMNODYTES,\* *Duméril and Bibron.*

Tongue long, narrowed in front, widened, forked, free behind; teeth on the vomer forming two groups, between the internal openings of the nostrils; tympanum distinct; Eustachian tubes middling; four fingers free; toes completely or partially webbed; sub-digital disks slightly dilated; process of the first os cuneiforme blunt, very minute; males with vocal sacs; sacral transversal processes not dilated.

##### LIMNODYTES ERYTHRÆUS, (Schlegel).

SYN.—*Hyla erythræa*, Schlegel.

*Hylarana erythræa* Tschudi.

*Limnodytes erythræus*, Duméril and Bibron.

Back and sides brown or reddish-olive; a longitudinal silvery white band from the eye to the loin; a second similar from the nostrils, parallel with the former. Beneath silvery white. The innerside of the extremities spotted and lineated with brown. Iris golden brown; pupil vertically rhomboidal.

HABIT.—*Malayan Peninsula.*

Java, Arracan.

Of three individuals observed, the largest was of the following dimensions:

\* This denomination has with propriety been substituted for the inadmissible *Hyla-Rana*, Tschudi.

|                                             |                      |
|---------------------------------------------|----------------------|
| Length of the head, . . . . .               | $0\frac{7}{8}$ inch. |
| · Ditto ditto trunk, . . . . .              | $1\frac{6}{8}$       |
| Ditto ditto anterior extremities, . . . . . | $1\frac{6}{8}$       |
| Ditto ditto posterior, . . . . .            | $4\frac{2}{8}$       |

GEN. POLYPEDATES, *Tschudi, apud Duméril and Bibron.*

Terminal joints of the fingers and toes widened into a large disk ; fingers slightly webbed at their base ; Eustachian tubes large ; in other particulars resembling *Limnodytes*.

POLYPEDATES LEUCOMYSTAX, (Gravenhorst.)

SYN.—*Hyla maculata*, Gray, *Illust. Ind. Zool.*

*Hyla leucomystax*, Gravenhorst.

*Polypedates leucomystax*, Tschudi, *apud Dum. and Bibr.*

Upper parts changeable : buff, ashy grey, chocolate brown, tinged with rose-or lilac, minutely or largely spotted with black. Upper lips white. A blackish band occupying the sides of the head, from the muzzle to tympanum. Beneath whitish or grey, uniformly, or minutely dotted with black. Posterior surface of the thighs blackish or vermiculated with white. Iris silvery or buff ; pupil horizontally rhomboidal.

HABIT.—*Pinang, Singapore, Malayan Peninsula.*

Malabar and Coromandel Coast, Bengal.

This species has the power of changing its colours as above described. Although it inhabits Singapore and the sultry plains of Bengal, it appears not to occur in the valleys at Pinang, but to affect the hills, at an elevation of more than 2000 ft., with a mean annual temperature of about  $71^{\circ}$

|                                             |                      |
|---------------------------------------------|----------------------|
| Length of the head, . . . . .               | $0\frac{6}{8}$ inch. |
| Ditto ditto trunk, . . . . .                | $1\frac{6}{8}$       |
| Ditto ditto anterior extremities, . . . . . | $1\frac{6}{8}$       |
| Ditto ditto posterior, . . . . .            | $4\frac{4}{8}$       |

FAM. BUFONIDÆ, FITZINGER.

GEN. BUFO, *Laurenti.*

Body inflated ; skin warty ; parotids porous ; toes united by a rudimentary membrane ; no teeth.

BUFO MELANOSTICTUS, Schneider.

SYN.—*Bufo scaber*, Daudin.

*Bufo bengalensis*, Daudin.



*Bufo scaber*, Latreille.

*Bufo scaber*, Daudin, Hist. Rept.

*Bufo bengalensis*, Daudin, Hist. Rept.

Le Crapaud de Bengale, Lesson.

*Bufo dubia*, Shaw, apud Gray, Illustr. Ind. Zool.

*Bufo carinatus*, Gray, Illustr. Ind. Zool.

*Bufo melanostictus*, apud Gravenhorst.

*Bufo scaber*, Tschudi.

“Kákong,” “Kútak púru,” of the Malays of the Peninsula.

Above earthy brown, grey or buff, in some marbled with black; lips, parotids, crests of the head, points of the tubercles, and last joints of fingers and toes: sooty, or black. Beneath buff, in some vermiculated with black. Iris golden brown; pupil transversely rhombic.

HABIT.—*Malayan Peninsula and Islands.*

Java, Tenasserim, Bengal, Coromandel.

In the Malayan countries this species swarms in valleys and hills. It has in a slight degree the power of changing its colours, and it utters a chirping, plaintive sound. The largest individuals examined, measured—

|                                              |                |
|----------------------------------------------|----------------|
| Length of the head, . . . . .                | 1 inch.        |
| Ditto ditto trunk, . . . . .                 | 3              |
| Ditto ditto anterior extremities, . . . . .  | $2\frac{2}{8}$ |
| Ditto ditto posterior extremities, . . . . . | $4\frac{2}{8}$ |

#### GEN. *HYLÆDACTYLUS*, Tschudi.

Tongue an oval disk, thick, free only at the lateral margins. Palatal teeth. Eustachian tubes very minute. No parotids. Four free fingers with the terminal joint widened, truncated. Five toes united at the base by a very small membrane, the terminal joint not widened; sole with two soft tubercles between tarsus and metatarsus. Sacral transversal processes forming triangular palettes.

#### *HYLÆDACTYLUS BIVITTATUS*, N. S.

Upper parts and outside of extremities brownish olive with distant small black spots. Head from the muzzle to the middle of the orbit whitish. A broad whitish band edged with black from the posterior angle of the eye, along each side to the loins. A shorter, oblique, similar band from the posterior angle of the eye. Beneath whitish, vermiculated with brown. The throat of the males black. Iris golden brown; pupil transversally rhombic.

HABIT.—*Malayan Peninsula.*

From *H. baleatus*, Tschudi, the present species differs both in colours and in the following particulars. The profile from the nose to coccyx forms a considerable arch, the highest part of which is the centre of the back. The male is provided with a vocal sac, the large openings of which are situated on each side of the tongue, and their presence is easily detected by the laxity of the (black) skin of the throat, which forms a broad transversal fold. Between the small openings of the Eustachian tubes the palate presents a considerable transversal fold of the skin, the free margin of which is fringed, which gives it the appearance of a row of teeth. A similar fold has been observed by M. M. Duméril and Bibron in the genera *Plectropus*, Dum. and Bibr., and in *Uperodon*, Dum. and Bibr. In front of this fold is another smaller, between the orbital protuberances. Behind each of the large internal openings of the nostrils, is an arched bony ridge, which in *H. baleatus* supports a few teeth. In the only individual of the present species examined, the free margin of the ridge is cutting, but without teeth. Over the symphysis of the lower jaw there is a small pointed process, fitting into a corresponding cavity in the margin of the upper jaw. In this species no less than in *Uperodon marmoratum*, Dum. and Bibr. nearly the whole of the thigh is hidden by the skin of the body, so that the posterior extremities are free but from a little above the knees. This character does not appear to exist in *Hylædactylus baleatus*, as it is not mentioned in the description of that species by M. M. Duméril and Bibron. On the anterior part of the back appear some indistinct rounded elevations; the rest of the upper parts is smooth. The skin of the throat and abdomen presents numerous transversal wrinkles, and is covered with minute tubercles. The toes are more slender than the fingers, and their last joint, although flattened, is not so broad, as that of the fingers, which is of a somewhat triangular form, truncated in front. In *H. baleatus* the fingers are longer than the toes. In the present species however the longest finger, the third, is nearly one-fourth shorter than the fourth toe.

The only individual which I had an opportunity of examining, after its death, was a male taken in a field near Malacca. It was of the following dimensions :

|                           |                       |
|---------------------------|-----------------------|
| Length of the head, ..... | 0 $\frac{3}{8}$ inch. |
| Ditto ditto trunk, .....  | 2 $\frac{6}{8}$       |

|                                            |                |
|--------------------------------------------|----------------|
| In a straight line from the muzzle to coc- |                |
| cyx, following the arch of the back, . .   | $3\frac{1}{8}$ |
| Length of the anterior extremities, . . .  | $1\frac{6}{8}$ |
| Ditto ditto posterior extremities, follow- |                |
| ing the posterior margin, . . . . .        | $2\frac{7}{8}$ |

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In the nomenclature adopted in the preceding Catalogue it has been my wish strictly to adhere to the Rules proposed by the Committee of the British Association for the Advancement of Science, published in the *Report of the twelfth Meeting*, Rules with which I regret I was unacquainted before the publication of the Catalogue of Malayan Mammalia.

I have to acknowledge my sense of obligation to the Hon'ble Sir William Norris, late Recorder of H. M. Court of Judicature in the Straits of Malacca, to W. T. Lewis, Esq. Asst. Res. Councillor, Prince of Wales Island, to W. Montgomerie, Esq., M. D. late Senior Surgeon, Straits of Malacca, and to Capt. Congalton, H. C. Steamer Hooghly for their assistance, to me so much more acceptable, as the limited leisure left me by the superintendence of six Hospitals in Prince of Wales Island, and a seventh in Province Wellesley, was latterly curtailed by additional, extra-professional duties, imposed upon me by the present local head authority in the Straits.

Fort William, June 1st, 1847.

#### EXPLANATION OF THE PLATES.

- PL. XX. *Dilophyrus grandis*, Gray.—(Natural size).  
 PL. XL. FIG. 1. *Calamaria longiceps*, Cantor.—(Magnified).  
 FIG. 2. *Lycodon effrænis*, Cantor.—(Magnified).  
 FIG. 3. *Dipsas boa*, (H. Boie).—(Natural size).  
 FIG. 4. *Homalopsis hydrina*, Cantor.—(Natural size).  
 FIG. 5. *Homalopsis leucobalia*, Schlegel, Var.—(Natural size).  
 FIG. 6. *Elaps melanurus*, (Shaw).—(Natural size).  
 FIG. 7. *Elaps nigromaculatus*, Cantor.—(Natural size).  
 FIG. 8. *Hydrus nigrocinctus*, (Daudin.) Var?—(Natural size).  
 FIG. 9. *Trigonocephalus sumatranus*, (Raffles.) Var.—(Natural size).

#### ADDENDA.

- P. 609. To SYN. *Emys crassicollis*, Bell, add: apud Horsfield: Life of Raffles.  
 P. 614. To *Gymnopus gangeticus*, (Cuv.) add: SYN. *Trionyx ocellatus*, Hardwicke (Young), apud Jaquemont: Atlas: Pl. 9.  
 P. 622. To SYN. *Crocodylus biporcatus*, Cuv. add: apud Horsfield: l. c.  
 P. 903. To SYN. *Python des îles de la Sonde*, add: Cuvier, R. A.

## LATITUDINAL DISTRIBUTION OF REPTILES

*Inhabiting the Malayan Peninsula and Islands and other Localities.*

[*Sp.* prefixed to localities signifies that they are inhabited by *species* of which varieties occur in Malayan countries.]

## CHELONIA.

|                                               |                               |                                                                             |
|-----------------------------------------------|-------------------------------|-----------------------------------------------------------------------------|
| 1 <i>Geoemyda spinosa</i> , Gray.             | Pinang.                       | Sumatra.                                                                    |
| 2 <i>Emys crassicollis</i> , Bell, ms.        | Pinang, Malayan Peninsula.    | Sumatra, Java.                                                              |
| 3 <i>Emys platynota</i> , Gray.               | Pinang, Malayan Peninsula.    | Sumatra.                                                                    |
| 4 <i>Emys trivittata</i> , Dum. & Bibr.       | Pinang, Malayan Peninsula.    | Bengal, Assam.                                                              |
| 5 <i>Cistudo amboinensis</i> , (Daud.)        | Singapore, Malayan Peninsula. | Java, Amboina, Philippines, Tenasserim Provinces.                           |
| 6 <i>Tetraonyx affinis</i> , Cantor.          | Pinang.                       |                                                                             |
| 7 <i>Gymnopus gangeticus</i> , (Cuv.)         | Pinang, Malayan Peninsula.    | Rivers and Bay of Bengal.                                                   |
| 8 <i>Gymnopus cartilagineus</i> , (Boddaert.) | Pinang, Malayan Peninsula.    | Java, Dukhun, "India," "China."                                             |
| 9 <i>Gymnopus indicus</i> , (Gray.)           | Pinang, Malayan Peninsula.    | Rivers of India, Philippines.                                               |
| 10 <i>Chelonia virgata</i> , Schweigger.      | Malayan Seas.                 | Teneriffe, Rio Janeiro, Cape of Good Hope, New York, Indian Ocean, Red Sea. |
| 11 <i>Chelonia imbricata</i> , (Linné.)       | Malayan Seas.                 | Atlantic and Indian Ocean.                                                  |
| 12 <i>Chelonia olivacea</i> , Eschscholtz.    | Malayan Seas.                 | Bay of Bengal, China Sea.                                                   |

## SAURIA.

|                                                          |                                      |                                                              |
|----------------------------------------------------------|--------------------------------------|--------------------------------------------------------------|
| 1 <i>Crocodylus vulgaris</i> . Cuv. Var. B, Dum. & Bibr. | Malayan Peninsula & Islands.         | Java, Sumatra, Tenasserim, Bengal, Coromandel, Malabar.      |
| 2 <i>Crocodylus porosus</i> , Schneider.                 | Pinang, Singapore, Malayan Peninsula | Seychelle Islands, Timor, Java, Sumatra, Tenasserim, Bengal. |
| 3 <i>Platydictylus lugubris</i> , Dum. and Bibr.         | Pinang.                              | Otaheite.                                                    |
| 4 <i>Platydictylus gecko</i> , (Linné.)                  | Malayan Peninsula.                   | Philippines, Java, Tenasserim, Burmah, Bengal, Coromandel.   |
| 5 <i>Platydictylus stentor</i> , Cantor.                 | Pinang.                              |                                                              |



|    |                                                                                                                   |                                       |                                                                                      |
|----|-------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------|
| 6  | <i>Platydictylus monarchus</i> , Schlegel.                                                                        | Pinang, Singapore, Malayan Peninsula. | Philippines, Amboina, Borneo.                                                        |
| 7  | <i>Ptychozoon homalocephalum</i> , (Creveld.)                                                                     | Pinang, Singapore.                    | Ramree Island (Arracan).                                                             |
| 8  | <i>Hemidactylus peronii</i> , Dum. and Bibr.                                                                      | Pinang.                               | Isle of France.                                                                      |
| 9  | <i>Hemidactylus coctæi</i> , Dum. and Bibr.                                                                       | Pinang.                               | Bengal, Bombay.                                                                      |
| 10 | <i>Hemidactylus frenatus</i> , Schlegel, ms.                                                                      | Pinang, Singapore, Malayan Peninsula  | Amboina, Timor, Java, Marian Isles, Ceylon, Bengal, Assam, South Africa, Madagascar. |
| 11 | <i>Hemidactylus platyurus</i> , (Schneider.)                                                                      | Pinang.                               | Philippines, Borneo, Java, Bengal, Assam.                                            |
| 12 | <i>Gymnodactylus pulchellus</i> , (Gray.)                                                                         | Pinang, Singapore.                    |                                                                                      |
| 13 | <i>Varanus nebulosus</i> , Dum. and Bibr.                                                                         | Pinang.                               | Java, Siam, Bengal.                                                                  |
| 14 | <i>Varanus flavescens</i> , (Gray.)                                                                               | Pinang.                               | Bengal, Nipal.                                                                       |
| 15 | <i>Varanus salvator</i> , (Laurenti.)                                                                             | Pinang, Malayan Peninsula.            | Philippines, Moluccas, Amboina, Java, Bengal, Assam.                                 |
| 16 | <i>Bronchocela cristatella</i> , (Kuhl.)                                                                          | Pinang, Singapore, Malayan Peninsula. | Amboina, Island of Buru, Java, Sumatra.                                              |
| 17 | <i>Lophyrus armatus</i> , (Gray.)                                                                                 | Pinang, Singapore.                    | Cochin-China.                                                                        |
| 18 | <i>Dilophyrus grandis</i> , Gray.                                                                                 | Pinang.                               | Rangoon.                                                                             |
| 19 | <i>Draco volans</i> , (Linné.)                                                                                    | Pinang, Singapore, Malayan Peninsula. | Philippines, Borneo, Java.                                                           |
| 20 | <i>Draco maculatus</i> , (Gray.)                                                                                  | Pinang.                               | Tenasserim.                                                                          |
| 21 | <i>Leiolepis bellii</i> , (Gray.)                                                                                 | Pinang, Malayan Peninsula.            | Cochin-China.                                                                        |
| 22 | <i>Eumeces punctatus</i> , (Linné.) Var.                                                                          | Pinang, Singapore, Malayan Peninsula. | Sp. Coromandel, Malabar, Bengal.                                                     |
| 23 | <i>Euprepis rufescens</i> , (Shaw.)<br>Var. D, Dum. and Bibr.<br>Var. E, Dum. and Bibr.<br>Var. F, Dum. and Bibr. | Pinang, Singapore, Malayan Peninsula  | Sp. Sandwich Islands, Philippines, Timor, Celebes, Borneo, Java, Coromandel, Bengal. |
| 24 | <i>Euprepis ernestii</i> , Dum. and Bibr.                                                                         |                                       | Java.                                                                                |
| 25 | <i>Lygosoma chalcides</i> , (Linné.)                                                                              | Pinang, Singapore.                    | Java.                                                                                |

## OPHIDIA.

## INNOCUOUS.

|    |                                                                                                           |                                                                                          |                                                                                                                  |
|----|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 1  | <i>Pilidion lineatum</i> , (Boie.)                                                                        | Pinang, Singapore.                                                                       | Java.                                                                                                            |
| 2  | <i>Typhlops nigro-albus</i> , Dum. and Bibr.                                                              | Pinang, Singapore.                                                                       | Sumatra.                                                                                                         |
| 3  | <i>Typhlops braminus</i> , (Daudin.)                                                                      | Pinang, Singapore, Malayan Peninsula.                                                    | Canton-Province, Philippines, Guam (Marian Isles), Java, Tenasserim, Bengal, Assam, Coromandel, Ceylon, Malabar. |
| 4  | <i>Cylindrophis rufus</i> , (Latreille.)                                                                  | Singapore.                                                                               | Java, Tranquebar, Bengal?                                                                                        |
| 5  | <i>Xenopeltis unicolor</i> , Reinwardt.                                                                   | Pinang, Singapore, Malayan Peninsula.                                                    | Celebes, Java, Sumatra.                                                                                          |
| 6  | <i>Python reticulatus</i> , (Schneider.)                                                                  | Malayan Peninsula & Islands.                                                             | Chusan? Amboina. Java, Banka, Sumatra, Bengal?                                                                   |
| 7  | <i>Acrochordus javanicus</i> , Hornstedt.                                                                 | Pinang, Singapore.                                                                       | Java.                                                                                                            |
| 8  | <i>Acrochordus granulatus</i> , (Schneider.)                                                              | Rivers and Sea of the Malayan Peninsula and Islands.                                     | Bay of Manilla, New-Guinea, Timor, Java, Sumatra, Coromandel.                                                    |
| 9  | <i>Calamaria lumbricoidea</i> , Schlegel, <i>Var.</i>                                                     | Pinang, Singapore.                                                                       | <i>Sp.</i> Celebes, Java.                                                                                        |
| 10 | <i>Calamaria linnei</i> , Boie, <i>Var.</i> Schlegel.                                                     | Pinang.                                                                                  | Java.                                                                                                            |
| 11 | <i>Calamaria longiceps</i> , Cantor.                                                                      | Pinang.                                                                                  |                                                                                                                  |
| 12 | <i>Calamaria sagittaria</i> , Cantor.                                                                     | Malayan Peninsula.                                                                       | Bengal, Assam.                                                                                                   |
| 13 | <i>Coronella baliodeira</i> , Schlegel.                                                                   | Pinang.                                                                                  | Java.                                                                                                            |
| 14 | <i>Xenodon purpurascens</i> , Schlegel.                                                                   | Pinang.                                                                                  | Java, Tenasserim.<br><i>Var.</i> Chirra Punji, Assam, Darjeling, Midnapore (Bengal.)                             |
| 15 | <i>Lycodon aulicus</i> , (Linné.)<br><i>Var. A,</i><br><i>Var. B,</i><br><i>Var. C,</i><br><i>Var. D,</i> | Pinang.<br>Pinang.<br>Pinang, Malayan Pen.<br>Pinang, Malayan Pen.<br>Malayan Peninsula. | Bengal, Coromandel.<br>Bengal.<br>Java, Tenasserim.<br>Pulo Samao, Timor.<br>Bengal.                             |
| 16 | <i>Lycodon platurinus</i> , (Shaw.)                                                                       | Pinang.                                                                                  | Java, Bengal?                                                                                                    |
| 17 | <i>Lycodon effrenis</i> , Cantor.                                                                         | Pinang.                                                                                  |                                                                                                                  |
| 18 | <i>Coluber fasciolatus</i> , Shaw.                                                                        | Malayan Peninsula.                                                                       | Coromandel.                                                                                                      |

|    |                                                                             |                                                                            |                                                                                                                                                                    |
|----|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19 | <i>Coluber radiatus</i> , Schlegel.                                         | Pinang, Singapore.<br>Malayan Peninsula                                    | Java, Sumatra, Cochin-China, Tenasserim, Assam.                                                                                                                    |
| 20 | <i>Coluber korros</i> , Reinwardt.                                          | Pinang, Singapore.<br>Malayan Peninsula.                                   | Java, Sumatra, Arracan, Tenasserim.                                                                                                                                |
| 21 | <i>Coluber hexagonotus</i> , Cantor.                                        | Pinang.                                                                    |                                                                                                                                                                    |
| 22 | <i>Dipsas dendrophila</i> , Reinwardt.                                      | Pinang, Singapore.<br>Malayan Peninsula.                                   | Celebes, Java.                                                                                                                                                     |
| 23 | <i>Dipsas multimaculata</i> , Schlegel.                                     | Pinang, Malayan Peninsula.                                                 | Celebes, Java, Tenasserim, Bengal.                                                                                                                                 |
| 24 | <i>Dipsas cynodon</i> , Cuvier.                                             | Pinang, Malayan Peninsula.                                                 | Java, Tenasserim.                                                                                                                                                  |
| 25 | <i>Dipsas boa</i> , Boie.                                                   | Pinang.                                                                    | Java.                                                                                                                                                              |
| 26 | <i>Herpetodryas oxycephalus</i> , (Reinwardt.)                              | Pinang.                                                                    | Celebes, Java.                                                                                                                                                     |
| 27 | <i>Dryinus prasinus</i> , (Reinwardt.)<br><br>Var. A,<br>Var. B,<br>Var. C, | Malayan Peninsula & Islands.<br><br>Same localities.<br>Pinang.<br>Pinang. | Celebes, Java, Cochin-China, Siam, Burmah, Tenasserim, Arracan, Bengal, Assam.<br>Same localities.                                                                 |
| 28 | <i>Leptophis pictus</i> , (Gmelin.)<br><br><br>Var. A,                      | Malayan Peninsula & Islands.<br><br><br>Malayan Peninsula.                 | Manilla, New Ireland, Waigiou, Amboina, New-Guinea, Pulo Samao, Java, Sumatra, Cochin-China, Tenasserim, Burmah, Bengal, Assam, Coromandel, Bengal, Assam, Ceylon. |
| 29 | <i>Leptophis caudalineatus</i> , Cantor.                                    | Pinang, Singapore.                                                         |                                                                                                                                                                    |
| 30 | <i>Leptophis ornatus</i> , (Shaw.)<br>Var.                                  | Pinang, Malayan Peninsula.                                                 | Sp. Bengal, Ceylon.<br>Java, Sumatra, Tenasserim, Arracan.                                                                                                         |
| 31 | <i>Tropidonotus umbratus</i> , (Daudin.)<br><br>Var.                        | Malayan Peninsula & Islands.                                               | Sp. Bengal, Assam, Coromandel, Ceylon.<br>Java, Bengal.                                                                                                            |
| 32 | <i>Tropidonotus stolatus</i> , (Liné)                                       | Pinang, Malayan Peninsula.                                                 | Philippines, Tenasserim, Bengal, Assam, Nipal, Coromandel, Ceylon, Bombay.                                                                                         |
| 33 | <i>Tropidonotus schistosus</i> , (Daudin.)<br><br>Var.                      | Malayan Peninsula.<br><br>Same locality.                                   | Philippines, Tenasserim, Bengal, Madagascar.<br>Same localities.                                                                                                   |
| 34 | <i>Tropidonotus cerasogaster</i> , (Cantor.)                                | Malayan Peninsula.                                                         | Bengal, Assam.                                                                                                                                                     |

|    |                                                         |                                              |                                                                                                  |
|----|---------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------|
| 35 | <i>Tropidonotus juncus</i> , Cant.                      | Pinang.                                      |                                                                                                  |
| 36 | <i>Homalopsis rhinchops</i> ,<br>(Schneider.)           | Malayan Peninsula &<br>Islands.              | New-Guinea, Amboina, Ti-<br>mor, Sarapua, Java, Su-<br>matra, Tenasserim, Bengal,<br>Coromandel. |
| 37 | <i>Homalopsis buccata</i> , (Linné.)                    | Pinang, Malayan Pen-<br>insula.              | Java.                                                                                            |
| 38 | <i>Homalopsis sieboldi</i> , Schlegel.                  | Malayan Peninsula.                           | Bengal.                                                                                          |
| 39 | <i>Homalopsis enhydrys</i> ,<br>(Schneider.)            | Malayan Peninsula &<br>Islands.              | Java, Tenasserim, Bengal,<br>Coromandel.                                                         |
| 40 | <i>Homalopsis plumbea</i> , Boie.                       | Pinang.                                      | Java.                                                                                            |
| 41 | <i>Homalopsis leucobalia</i> ,<br>Schlegel, <i>Var.</i> | Pinang, Malayan Pen-<br>insula.              | <i>Sp.</i> Timor.                                                                                |
| 42 | <i>Homalopsis hydrina</i> , Cantor.                     | Sea off Pinang and the<br>Malayan Peninsula. |                                                                                                  |

## VENOMOUS.

|    |                                                              |                                          |                                                                                                                                                                           |
|----|--------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 43 | I. <i>Elaps melanurus</i> , (Shaw.)                          | Malayan Peninsula.                       | Tenasserim, Nerva, (Coro-<br>mandel.)                                                                                                                                     |
| 44 | II. <i>Elaps intestinalis</i> , (Lau-<br>renti.) <i>Var.</i> | Pinang, Singapore,<br>Malayan Peninsula  | <i>Sp.</i> Java, Malwah, (Central<br>India.)                                                                                                                              |
| 45 | III. <i>Elaps nigromaculatus</i> ,<br>Cantor.                | Pinang, Singapore.                       |                                                                                                                                                                           |
| 46 | IV. <i>Elaps bivirgatus</i> , Kuhl,<br><i>Var.</i>           | Pinang, Malayan Pen-<br>insula.          | <i>Sp.</i> Java, Sumatra.                                                                                                                                                 |
| 47 | V. <i>Bungarus flaviceps</i> , J.<br>Reinhardt.              | Pinang.                                  | Java.                                                                                                                                                                     |
| 48 | VI. <i>Bungarus candidus</i> ,<br>(Linné.)                   | Malayan Peninsula.                       | Java, Tenasserim, Bengal,<br>Assam, Coromandel, Cey-<br>lon, Malabar.                                                                                                     |
| 49 | VII. <i>Bungarus fasciatus</i> ,<br>(Schneider.)             | Pinang, Malayan Pen-<br>insula.          | Java, Tenasserim, Bengal,<br>Coromandel.                                                                                                                                  |
| 50 | VIII. <i>Hamadryas ophiopha-<br/>gus</i> , Cantor.           | Pinang, Singapore,<br>Malayan Peninsula. | Java, Sumatra, Bengal, As-<br>sam, Coromandel.                                                                                                                            |
| 51 | IX. <i>Naja lutescens</i> , Lau-<br>renti.                   |                                          | <i>Sp.</i> Countries between the<br>Sutledj and Cape Como-<br>rin, Ceylon, Hindoostan<br>to Cape Romania, Suma-<br>tra, Java, Ternate, Bori-<br>neo, Philippines, Chusan. |
|    | <i>Var. D</i> , (Daudin.)                                    | Pinang, Singapore,<br>Malayan Peninsula  | Bengal, Coromandel.                                                                                                                                                       |
|    | <i>Var. nigra</i> ,                                          | Pinang, Singapore.                       |                                                                                                                                                                           |



|    |                                                         |                                              |                                                                                                                                               |
|----|---------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 52 | X. <i>Trigonocephalus gramineus</i> , (Shaw.)           | Pinang, Singapore, Malayan Peninsula.        | New Holland, Timor, Pulo Samao, Celebes, Eastern Java, Banka, Sumatra, Tenasserim, Bengal, Chirra Punji, Nipal, Coromandel, Ceylon.           |
|    | Var.                                                    | Pinang, Singapore, Malayan Peninsula         | Sumatra, Tenasserim.                                                                                                                          |
| 53 | XI. <i>Trigonocephalus sumatranus</i> , (Raffles.) Var. | Pinang, Singapore, Malayan Peninsula.        | Sp. Sumatra.                                                                                                                                  |
| 54 | XII. <i>Trigonocephalus puniceus</i> , Reinwardt.       | Pinang, Singapore, Malayan Peninsula.        | Java.                                                                                                                                         |
| 55 | XIII. <i>Laticauda scutata</i> , Laurenti.              | Sea of the Malayan Peninsula and Islands.    | Bay of Bengal, Sea of Timor, Celebes, Molucca, and Liewkiew Islands, New Guinea, Tongataboo, China Sea.                                       |
| 56 | XIV. <i>Hydrus striatus</i> , (Lacépède.)               | Sea of Pinang, Malayan Peninsula.            | Sea of Liewkiew Islands, Timor, Sumatra, Bay of Bengal.                                                                                       |
| 57 | XV. <i>Hydrus nigrocinctus</i> , (Daudin.)              | Sea of Pinang, Singapore, Malayan Peninsula. | Bay of Bengal, estuaries of the Ganges.                                                                                                       |
|    | Var. ?                                                  | Sea off Pinang.                              |                                                                                                                                               |
| 58 | XVI. <i>Hydrus gracilis</i> , Shaw.                     | Sea of Malayan Peninsula and Islands.        | Bay of Bengal, Malabar, Sumatra, Borneo.                                                                                                      |
| 59 | XVII. <i>Hydrus schistosus</i> , (Daudin.)              | Sea of Malayan Peninsula and Islands.        | Bay of Bengal, Malabar, Sumatra.                                                                                                              |
| 60 | XVIII. <i>Hydrus pelamidoi</i> , (Schlegel.)            | Sea of Malayan Peninsula and Islands         | Bay of Bengal, Sea of Celebes, Molucca Islands, China Sea.                                                                                    |
| 61 | XIX. <i>Hydrus bicolor</i> , (Schneider.)               | Sea of Malayan Peninsula.                    | Bay of Bengal, Sea of Sumatra, Java, Celebes, Moluccas, China Sea (to 27° N. L.) Otaheite, Bay of Port Jackson (33° 55' S. L. 151° 25' E. L.) |

## BATRACHIA.

|   |                                                  |                                |                                                                                            |
|---|--------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------|
| 1 | <i>Ichthyophis glutinosus</i> , (Linneé.) Var. ? | Singapore.                     | Sp. Java, Ceylon, Assam.                                                                   |
| 2 | <i>Rana leschenaulti</i> , Dum. and Bibr.        | Malayan Peninsula.             | Bengal, Pondicherry.                                                                       |
| 3 | <i>Rana tigrina</i> , Daudin.                    | Malayan Peninsula and Islands. | Coromandel, Bengal, Assam, Tenasserim, Java, Sumatra, Timor, Philippines, Canton Province. |

|   |                                                       |                                          |                                          |
|---|-------------------------------------------------------|------------------------------------------|------------------------------------------|
| 4 | <i>Megalophrys montana</i> , Wag-<br>ler, <i>Var.</i> | Pinang.                                  | <i>Sp. Java.</i>                         |
| 5 | <i>Limnodytes erythræus</i> ,<br>(Schlegel.)          | Malayan Peninsula.                       | Java, Tenasserim, Arracan.               |
| 6 | <i>Polypedates leucomystax</i> ,<br>(Gravenhorst.)    | Pinang, Singapore,<br>Malayan Peninsula. | Bengal, Coromandel, Mala-<br>bar.        |
| 7 | <i>Bufo melanostictus</i> , Schnei-<br>der.           | Malayan Peninsula<br>and Islands.        | Java, Tenasserim, Bengal,<br>Coromandel. |
| 8 | <i>Hylædactylus bivittatus</i> ,<br>Cantor.           | Malayan Peninsula.                       |                                          |

## ALTITUDINAL DISTRIBUTION OF REPTILES

### INHABITING THE MALAYAN PENINSULA AND ISLANDS, AND OTHER LOCALITIES.

[The extra-Malayan localities have necessarily been confined to such of which the elevation has been specified by authors, the Malayan are given from personal observation.]

PRINCE OF WALES ISLAND (PULO PINANG), 5° 25' N. L. 100° 19' E. *Valley*: Mean annual temperature: 80° 03 Fahr. Average monthly range of the thermometer: 11°; greatest daily range: 13°. Annual quantity of rain: 65.5 inch. (145 days).

*Hills*. Granite. Highest elevation (*Western Hill*) 2,500 ft. Mean annual temperature 71°. Average monthly range of the thermometer 10°; greatest daily range 9°. Annual quantity of rain: 116.6 inch (174 days). Vegetation even for a tropical distinguished by luxuriance, beauty and variety. Characteristic features: Filices. (*Alsophila contaminans*, Wal.—*Schizæa dichotoma*,—*Neuroplatyceros* (*Acrostichum*) *biforme*, Desvontaine. *Polypodium horsfieldii*, Bennett.)

Pandanaceæ. (*Freycinetia*).

Taccaceæ. (*Tacca cristata*, Jack).

Palmaceæ. (*Areca catechu*, Willd. *Arenga saccharifera*, Labill. *Nipa fruticans*. *Euoplus tigillaria*, Jack. "*Pinang Lawyer*."\* *Calamus*).

Scitamineæ. (*Hedychium sumatranum*, Jack. *Amomum biflorum*, Jack).

Orchidaceæ.

Taxaceæ. (*Dacrydium*. *Podocarpus*).

Gnetaceæ. (*Gnetum gnemon*. *Gnetum brunonianum*).

Artocarpeæ. (*Phytocrene palmata*, Wal. *Phytocrene bracteata*,† Wal.)

Nepenthaceæ. (*Nepenthes distillatoria*. *Nepenthes ampullaria*, Jack).

Gesneraceæ. (*Didymocarpus crinitus*, Jack).

Euphorbiaceæ.

Corylaceæ. (*Quercus racemosa*, Jack. *Lithocarpus javensis*, Blume).

An undescribed dwarf palm, hitherto supposed to be confined to the hills of Pinang. Sir William Norris found it on Mount Ophir in 1847.

† This species appears to be confined to the lower parts of the hills and the valleys.

Begoniaceæ. (*Begonia orbiculata*, Jack).

Stereuliaceæ. (*Stereulia coccinea*, Roxburgh. *Durio Zibethinus*, Lin.)

Dipteraceæ. (*Dipterocarpus*).

Aurantiaceæ. (*Murraya paniculata*, Loar).

Anacardiaceæ. (*Stagmaria verniciflua*, Jack).

Connaraceæ. (*Eurycoma longifolia*, Jack).

Garcinieæ.

Melastomaceæ. (*Melastoma bracteata*, Jack. *M. exigua*, Jack. *M. glauca*, Jack. *Sonerila moluccana*, Rob.)

Myrtaceæ.

SINGAPORE ISLAND, 1° 24' N. L. 104° E. Mean annual temperature, 80°. Greatest daily range of thermometer: 10°. Annual number of rainy days: 185. Surface gently undulating. Sand-stone hills, indicating remote convulsion; highest hill (*Bukit Timah*) 530 ft., granite. In the valleys occur vegetable and animal forms which at Pinang have been observed at or near the summit of the hills, but not in the plains. Thus at Singapore, occur *Alsophila*, *Schizæa*, *Tucca cristata*, *Gnetum*, *Nepenthes*, *Begonia*, *Eurycoma* and others, which at Pinang appear to affect a much greater elevation. Instances of Reptiles in common to the plains of Singapore and the hills of Pinang are: *Ptychozoon homalocephalum*, *Gymnodactylus pulchellus*, *Lygosoma chalcides*, *Pilidion lineatum*, *Typhlops nigro-albus*, *Calamaria lumbricoidea*, Var. *Leptophis caudalineatus*, *Elaps intestinalis*, *Elaps nigromaculatus*.

MALAYAN PENINSULA. Geographically, not politically, from 12° N. L. between 98° and 104° E. computed to about 80,000 square miles, or about 4000 square miles less than Great Britain. Zoological information has hitherto been confined almost exclusively to the plains of the western part. The productions of the chain of mountains dividing the Peninsula, and terminating in Cape Romania in 1° 17' N. L. (Point Bûrus in 1° 15' N. L.) are almost entirely unknown. The late Mr. Griffith on a visit in the early part of 1842 to mount Ophir (*Gûnong Lédang*, in about 2° 30' N. L. on the eastern boundary of the district of Malacca, granite, and computed about 4000 ft.) made the interesting discovery, that from 1500 ft. and upwards the vegetation changes completely, and in many respects assumes a Polynesian or Australian character. Early in 1847 Lieutenant Colonel James Low visited Keddah Peak, (*Gûnong Jerai*,) opposite to the town of Keddah, in about 6° 5' N. L. which he observes is not granite, but stratified, abounding in minerals. According to observation of the boiling point of water, the summit, a small platform on the edge of the strata, is 5,705½ ft. above the sea. Towards the summit the vegetation becomes very stunted and partakes of Australian character.\* Colonel Low further observes that during the ascent he did not see a single animal, but found foot prints of a Rhinoceros, smaller than usual, he supposes, up to the very summit. To a casual visiter of the Malayan hill forest, during the day, the paucity of animals is a striking feature. The noonday light subdued by the dense foliage of the towering stems, gives to the scene a sombre character, heightened by the unseen denizens. Their presence is manifested in the shrill vibrations of Cicadae, one of which on the Pinang hills is noted for its resemblance to the cavalry trumpet, the call of the Tupai, the dismal tap of the gigantic woodpecker, the creaking flight of a Buceros, or the retreat of frightened Semnothees.

\* A collection of plants from the summit of the mountain, with which Colonel Low favoured me, were examined by Capt. Munro, H. M. 39th Regiment, the only botanist at present in Calcutta, previously to their being despatched to the Royal Gardens, Kew.

## CHELONIA.

| SPECIES.                                   | HILLS.  | PLAINS.                                                                               |
|--------------------------------------------|---------|---------------------------------------------------------------------------------------|
| <i>Geoemyda spinosa</i> , Gray.            | Pinang. |                                                                                       |
| <i>Emys crassicolis</i> , Bell, MS.        |         | Ponds and rivulets Malayan Peninsula, Pinang.                                         |
| <i>Emys platynota</i> , Gray.              |         | Malayan Peninsula, Pinang.                                                            |
| <i>Emys trivittata</i> , Dum. & Bibr.      |         | Ponds and rivers Malayan Peninsula, Pinang, Bengal.                                   |
| <i>Cistudo amboinensis</i> , (Daud.)       |         | Ditto ditto.                                                                          |
| <i>Tetraonyx affinis</i> , Cantor.         |         | Sea off Pinang.                                                                       |
| <i>Gymnopus gangeticus</i> , (Cuvier.)     |         | Rivers and sea-coast Malayan Peninsula, Bengal.                                       |
| <i>Gymnopus cartilagineus</i> , (Bodaert.) |         | Ponds and rivers Malayan Peninsula, Pinang, Java, Dukhun, "India," "China."           |
| <i>Gymnopus indicus</i> , (Gray.)          |         | Rivers, estuaries and sea-coast Malayan Peninsula, Pinang, India, Philippine Islands. |
| <i>Chelonia virgata</i> , Schw.            |         | } Sea.                                                                                |
| <i>Chelonia imbricata</i> , (Lin.)         |         |                                                                                       |
| <i>Chelonia olivacea</i> , Eschscholtz.    |         |                                                                                       |

## SAURIA.

|                                                        |         |                                                                                                                        |
|--------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------|
| <i>Crocodylus vulgaris</i> , Cuv. Var. B, Dum. & Bibr. |         | Rivers, estuaries and sea-coast Malayan Peninsula and Islands, Java, Sumatra, Tenasserim, Bengal, Coromandel, Malabar. |
| <i>Crocodylus porosus</i> , Schneider.                 |         | Ditto ditto and Seychelle Islands, Timor.                                                                              |
| <i>Platydictylus lugubris</i> , Dum. & Bibr.           |         | Pinang.                                                                                                                |
| <i>Platydictylus gecko</i> , (Linné.)                  |         | Malayan Peninsula, Bengal.                                                                                             |
| <i>Platydictylus stentor</i> , Cantor.                 | Pinang. |                                                                                                                        |
| <i>Platydictylus monarchus</i> , Schlegel.             | Pinang. | Pinang, Malayan Peninsula, Singapore.                                                                                  |
| <i>Ptychozoon homalocephalum</i> , (Crevel.)           | Pinang. | Singapore.                                                                                                             |
| <i>Hemidactylus peronii</i> , Dum. & Bibr.             |         | Pinang.                                                                                                                |
| <i>Hemidactylus coctei</i> , Dum. & Bibr.              |         | Pinang, Bengal.                                                                                                        |
| <i>Hemidactylus frenatus</i> , Schlegel, MS.           | Pinang. | Pinang, Singapore, Malayan Peninsula, Bengal.                                                                          |
| <i>Hemidactylus platyurus</i> , (Schneider.)           |         | Pinang, Bengal.                                                                                                        |
| <i>Gymnodactylus pulchellus</i> , (Gray.)              | Pinang. | Singapore.                                                                                                             |



| SPECIES.                                                                                                 | HILLS.                     | PLAINS.                                 |
|----------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------|
| <i>Varanus nebulosus</i> , Dum. & Bibr.                                                                  | Pinang.                    | Bengal.                                 |
| <i>Varanus flavescens</i> , (Gray.)                                                                      |                            | Pinang, Bengal.                         |
| <i>Varanus salvator</i> (Laurenti.)                                                                      | Pinang.                    | Malayan Peninsula, Bengal.              |
| <i>Bronchocela cristatella</i> , (Kuhl)                                                                  | Pinang, Malayan Peninsula. | Malayan Peninsula, Singapore.           |
| <i>Lophyrus armatus</i> , (Gray.)                                                                        |                            | Pinang, Singapore.                      |
| <i>Dilophyrus grandis</i> , Gray.                                                                        | Pinang.                    |                                         |
| <i>Draco volans</i> , Linné.                                                                             | Pinang.                    | Pinang, Malayan Peninsula.              |
| <i>Draco maculatus</i> , (Gray.)                                                                         | Pinang.                    |                                         |
| <i>Leiolepis bellii</i> , (Gray.)                                                                        |                            | Pinang, Malayan Peninsula.              |
| <i>Eumeces punctatus</i> , (Lin.) Var.                                                                   | Pinang.                    | Pinang, Malayan Peninsula, Singapore.   |
| <i>Euprepis rufescens</i> , (Shaw.)<br>Var D, Dum. & Bibr.<br>Var E, Dum. & Bibr.<br>Var F, Dum. & Bibr. | } Pinang.                  | } Pinang, Malayan Peninsula, Singapore. |
| <i>Euprepis ernestii</i> , Dum. and Bibr.                                                                |                            | Pinang, Malayan Peninsula.              |
| <i>Lygosoma chalcides</i> , (Linné.)                                                                     | Pinang.                    | Singapore.                              |

## OPHIDIA.

## Innocuous.

|                                                |                            |                                                                                                                      |
|------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------|
| <i>Pilidion lineatum</i> , (Boie.)             | Pinang.                    | Singapore.                                                                                                           |
| <i>Typhlops nigro-albus</i> , Dum. & Bibr.     | Pinang.                    | Singapore.                                                                                                           |
| <i>Typhlops braminus</i> , (Daudin.)           | Pinang, Malayan Peninsula. | Pinang, Singapore, Malayan Peninsula, Bengal, Assam.                                                                 |
| <i>Cylindrophis rufus</i> , (Laurenti.)        |                            | Singapore, Tranquar, Bengal.                                                                                         |
| <i>Xenopeltis unicolor</i> , Reinwardt.        | Pinang.                    | Singapore, Malayan Peninsula.                                                                                        |
| <i>Python reticulatus</i> , (Schneider.)       | Pinang, Malayan Peninsula. | Pinang, Singapore, Malayan Peninsula, Bengal?                                                                        |
| <i>Acrochordus javanicus</i> , Hornstedt.      | Pinang.                    | Singapore, Java.                                                                                                     |
| <i>Acrochordus granulatus</i> , (Schneider.)   |                            | Rivers and Sea-coast of Malayan Peninsula and Islands, New-Guinea, Timor, Java, Sumatra, Coromandel, Bay of Manilla. |
| <i>Calamaria lumbricoidea</i> , Schlegel, Var. | Pinang.                    | Singapore.                                                                                                           |
| <i>Calamaria linnei</i> , Boie, Var, Schlegel. | Pinang.                    | Java.                                                                                                                |
| <i>Calamaria longiceps</i> , Cantor.           | Pinang.                    |                                                                                                                      |
| <i>Calamaria sagittaria</i> , Cantor.          |                            | Malayan Peninsula, Bengal.                                                                                           |
| <i>Coronella baliodeira</i> , Schlegel.        | Pinang.                    |                                                                                                                      |

| SPECIES.                                       | HILLS.                         | PLAINS.                                                                                               |
|------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------|
| <i>Xenodon purpurascens</i> , Schlegel.        | Pinang.                        | Java.                                                                                                 |
| <i>Lycodon aulicus</i> , (Linné.)              | Pinang.                        | Pinang, Malayan Peninsula, Bengal.                                                                    |
| Var. A,                                        | Pinang.                        | Pinang, Bengal.                                                                                       |
| Var. B,                                        | Pinang.                        | Pinang, Malayan Peninsula.                                                                            |
| Var. C,                                        | Pinang, Malayan Peninsula.     | Pinang, Malayan Peninsula.                                                                            |
| Var. D,                                        |                                | Malayan Peninsula, Bengal.                                                                            |
| <i>Lycodon platurinus</i> , (Shaw.)            | Pinang.                        | Bengal?                                                                                               |
| <i>Lycodon effrænis</i> , Cantor.              | Pinang.                        |                                                                                                       |
| <i>Coluber fasciolatus</i> , Shaw.             |                                | Malayan Peninsula, Coromandel.                                                                        |
| <i>Coluber radiatus</i> , Schlegel.            |                                | Pinang, Singapore, Malayan Peninsula.                                                                 |
| <i>Coluber korros</i> , Reinwardt.             |                                | Pinang, Singapore, Malayan Peninsula.                                                                 |
| <i>Coluber hexagonotus</i> , Cantor.           | Pinang.                        |                                                                                                       |
| <i>Dipsas dendrophila</i> , Reinwardt.         | Pinang, Malayan Peninsula.     | Pinang, Singapore, Malayan Peninsula, Java.                                                           |
| <i>Dipsas multimaculata</i> , Schlegel.        | Pinang.                        | Malayan Peninsula.                                                                                    |
| <i>Dipsas cynodon</i> , Cuvier.                | Pinang.                        | Malayan Peninsula.                                                                                    |
| <i>Dipsas boa</i> , Boie.                      | Pinang.                        | Java.                                                                                                 |
| <i>Herpetodryas oxycephalus</i> , (Reinwardt.) | Pinang.                        |                                                                                                       |
| <i>Dryinus prasinus</i> , (Reinwardt.)         | Malayan Peninsula and Islands. | Malayan Peninsula and Islands.                                                                        |
| Var. A,                                        | Ditto.                         | Ditto.                                                                                                |
| Var. B,                                        | Pinang.                        |                                                                                                       |
| Var. C,                                        | Pinang.                        |                                                                                                       |
| <i>Leptophis pictus</i> , (Gmelin.)            | Malayan Peninsula and Islands. | Malayan Peninsula and Islands, Bengal.                                                                |
| Var. A,                                        | Ditto.                         | Ditto.                                                                                                |
| <i>Leptophis caudalineatus</i> , Cantor.       | Pinang.                        | Singapore.                                                                                            |
| <i>Leptophis ornatus</i> , (Shaw.) Var.        | Pinang.                        | Malayan Peninsula.                                                                                    |
| <i>Tropidonotus umbratus</i> , (Daud.) Var.    |                                | Malayan Peninsula and Islands, Java, Bengal.                                                          |
| <i>Tropidonotus stolatus</i> , (Linné.)        |                                | Pinang, Malayan Peninsula, Bengal, Nipal, Coromandel, Bombay.                                         |
| <i>Tropidonotus schistosus</i> , (Dau.) Var.   |                                | Malayan Peninsula, Bengal. Ditto ditto.                                                               |
| <i>Tropidonotus cerasogaster</i> , (Cantor.)   |                                | Malayan Peninsula, Bengal.                                                                            |
| <i>Tropidonotus junceus</i> , Cantor.          | Pinang.                        |                                                                                                       |
| <i>Homalopsis</i> .                            |                                | All the Malayan species inhabit fresh-water, rivers, estuaries or the sea-coast, as noted under each. |

## VENOMOUS.

| SPECIES.                                            | HILLS.                                   | PLAINS.                                                          |
|-----------------------------------------------------|------------------------------------------|------------------------------------------------------------------|
| <i>Elaps melanurus</i> , (Shaw.)                    |                                          | Malayan Peninsula, Tenasserim, Nerva.                            |
| <i>Elaps intestinalis</i> , (Laurenti.)<br>Var.     | Pinang.                                  | Singapore, Malayan Peninsula, Sp. Java, Malwah, (Central India.) |
| <i>Elaps nigromaculatus</i> , Cantor.               | Pinang.                                  | Singapore.                                                       |
| <i>Elaps bivirgatus</i> , Kuhl. Ver.                | Pinang.                                  | Malayan Peninsula.                                               |
| <i>Bungarus flaviceps</i> , J. Reinwardt.           | Pinang.                                  |                                                                  |
| <i>Bungarus candidus</i> , (Linné.)                 |                                          | Malayan Peninsula, Bengal, Coromandel, Malabar.                  |
| <i>Bungarus fasciatus</i> , (Schneider.)            |                                          | Pinang, Malayan Peninsula, Bengal, Coromandel.                   |
| <i>Hamadryas ophiophagus</i> , Cantor.              | Pinang.                                  | Singapore, Malayan Peninsula, Bengal.                            |
| <i>Naja lutescens</i> , Laurenti. Var. D. (Daud.)   | Pinang, Malayan Peninsula.               | Pinang, Singapore, Malayan Peninsula, Bengal, Coromandel.        |
| Var. <i>nigra</i> .                                 | Pinang.                                  | Pinang, Singapore.                                               |
| <i>Trigonocephalus gramineus</i> , (Shaw.)          | Pinang, Malayan Peninsula, Chirra Punji. | Pinang, Singapore, Malayan Peninsula, Bengal, Nipal.             |
| Var.                                                | Pinang, Malayan Peninsula.               | Pinang, Singapore, Malayan Peninsula.                            |
| <i>Trigonocephalus sumatranus</i> , (Raffles.) Var. |                                          | Pinang, Singapore, Malayan Peninsula. Sp. Sumatra.               |
| <i>Trigonocephalus puniceus</i> , Reinwardt.        |                                          | Pinang, Singapore, Malayan Peninsula.                            |
| <i>Laticauda Hydrus</i> .                           |                                          | All species inhabit the sea or estuaries.                        |

## BATRACHIA.

|                                                    |                                |                                         |
|----------------------------------------------------|--------------------------------|-----------------------------------------|
| <i>Ichthyophis glutinosus</i> , (Linné.)<br>Var. ? |                                | Singapore.                              |
| <i>Rana leschenaulti</i> , Dum. and Bibr.          |                                | Malayan Peninsula, Bengal, Pondicherry. |
| <i>Rana tigrina</i> , Daudin.                      | Malayan Peninsula & Islands.   | Malayan Peninsula and Islands, Bengal.  |
| <i>Megalophrys montana</i> , Wagler, Var.          | Pinang, Sp. Java.              |                                         |
| <i>Limnodytes erythræus</i> , (Schlegel.)          |                                | Malayan Peninsula.                      |
| <i>Polypedates leucomystax</i> , (Gravenhorst.)    | Pinang, Malayan Peninsula.     | Singapore, Malayan Peninsula, Bengal.   |
| <i>Bufo melanostictus</i> , Schneider              | Malayan Peninsula and Islands. | Malayan Peninsula and Islands, Bengal.  |
| <i>Hyladactylus bivittatus</i> , Cantor.           |                                | Malayan Peninsula.                      |

*Memorandum regarding the recently discovered ruins of Ranode, in Scindeah's Dominions ; by HENRY COPE, Secretary Archæological Society of Dehli.\**

The Right Honorable the Governor General having most liberally sanctioned, by a late order, the appointment of Lieut. F. Maisey, of the 67th Regt. N. I., to investigate the ruins of Ranode, in compliance with the suggestion of the Archæological Society of Dehli, it may be considered desirable to publish the principal inscription on those ruins, with the view of eliciting information contemporary with the researches of Lieut. Maisey ; and I have the honor to submit a brief account of the place, drawn up from the Memoranda supplied to the Society by Capt. R. R. Ellis of Shansee, when the inscription was originally forwarded by him.

Ranode is situate in the Chandoree district of Scindeah's dominions, about 35 miles nearly due South of the famous fort of Nurwur, and at no great distance (apparently 6 or 7 miles) east of the high road from Agra to Bombay. Although marked in the maps, as a place of some consequence, it is not mentioned in Hamilton's Gazetteer, and I find no account of it elsewhere. It is close on the banks of the Airawati, a small stream which takes its rise at Indore (not the capital of Holkar's dominions) three kos from Ranode, and where there is a stone image of Bhīm Sen, one of the Pandu princes, and also the remains of ancient buildings.

The edifice in which the inscription, forwarded to the Society by Capt. Ellis, was found, was first brought to light by Capt. A. Dewar, commanding the 1st Calvary of Scindeah's contingent, and is known in the neighbourhood as the "Kokai Mahal." It is built of gigantic masses of hard freestone, without any ornamental sculpture, beautifully fitted together without a particle of cement.

From the rough sketches drawn apparently by a native, and which accompanied the inscription, it is clear that this edifice is one of considerable extent ; the inscription is cut on an erect tablet, situate at the end of one of the varandahs of the Palace.

\* Communicated with the inscription and translation, by the Archæological Society of Dehli.—EDS.



There are besides this, the principal building, two tanks of considerable dimensions, named the Gass and Bhowkebaoli. There are also in the neighbourhood some Musalman tombs with inscriptions of the reign of Aurungzeb.

About eight kos further down the Airawati stream, is Kandalpur, said to be the Kandalpur mentioned in Wilkins' translation of the Bhagavat, from which Krishna carried off Rukhmini, the betrothed wife of his cousin Sisupal, the Rajah of Chanderi.

From the mere glimpse which this imperfect sketch affords of the ruins in question, we perceive that the field of investigation is ample, not only at Ranode itself, but in the neighbourhood, and we may reasonably expect very important results from Mr. Maisey's researches.

The translation which accompanied the inscription is prepared by H. M. Elliot, Esq., C. S., Secretary to the Government of India. I am assured by that distinguished Orientalist that not a name that occurs in the document is to be found in any of the genealogies hitherto published. We may further hope that several of the letters and words now omitted as undecypherable, may be restorable on such a careful investigation as Lieut. Maisey will be able to carry on.

#### INSCRIPTION.

ॐ नमः शिवाय ॥ प्रावृषेण्ये नवाम्भोदगर्जितोर्जित्यजन्तिवः । वैनाय  
कानि निघ्नन्तु निर्विघ्नं नर्त्तितान्यघम् ॥ प्रसन्नोजस्विनी व्यक्तायत्तरूपा  
भयंकरादेवताबाक्सरिद्धेदरक्षतादः सरस्वती । संपूर्णाङ्गमशेषकल्म  
षमुषः सम्पन्नमप्यादरादूरं पादतलावघट्टननमत् कैलासनश्यत्स्थितिः ।  
सानन्दं युगपत्सुरासुरसभासंरम्भदत्तव्यथं शम्भोर्लास्यपरिग्रहस्य दिश  
तुश्रेयांसि बः स्थानकम् ॥ चरणभरावनता वनिविनमत्कमठोर कन्ध  
राखणोदनाद्यस्य धूर्जटेधुरिबर्णं परिष्यन्दकाकलीर्जयति ॥ उत्क्षिप्तोदण्ड  
पादाम्बुज गणततिभिः सार्द्धमुन्नम्य भूयः प्रायाद्यावत्स्वसीमामपरप  
दभरभृष्टपृष्ठान्तभूमिः ॥ इत्थं दोः स्थिपिरङ्गे गगनतलचलचारिका  
चारवृत्तैस्त्रायन्तां वस्त्रिसन्ध्यं त्रिपुरविजयिनस्ताण्डवक्रोडितानि । भक्त्यो  
पसन्नं स्थिरभक्ति काम्यपद्मासनं दारुवनेतिरम्ये विधाययज्ञं विधिनावि  
धिज्ञः किलानुजग्राहपुपुरारिः ॥ यच्छङ्खलं विपुलनिर्वृति वीजमु  
च्चैः पूर्वोत्तरं विपुलवर्द्धितभूरिशिखः । तस्मादपूर्वउदभून्मुनि बंशवृष  
निर्यथिरत्नरतिसारतरः सुरतः । तस्मिन्मुनिः सकललोकनमस्यमूर्तिरि

न्द्रूपमःप्रतिदिनं समुदीयमानः । श्रीमानभूद्रुविकदस्वगुहानिवासीतस्मा  
 च्छारमठिकाधिपतिर्मुनीन्द्रः । तैरब्धिपालः प्रमथाधिप्रस्यतुलां दधत्वा  
 मजयोदयेन । ततोभवद्भूरितपास्ततोपि सुख्यातिरामर्दकतीर्थनाथः ॥ त  
 स्मात्पुनरन्दरगुरुर्गुरुवद्भूरिभ्यः प्रज्ञातिरेक जनितस्यवभूवभूमिः । यस्या  
 धुनापिविवुधैरितिकृत्यशंसिष्याहन्यतेनवचनं नयमार्गविद्धिः ॥ धन्यः  
 कोपिचकास्यचिन्त्यमहिमातुल्योमुनिर्भास्वता राजानुत्तमशब्दपूर्वशिख  
 राभ्यर्णप्रकीर्णद्युतिः ॥ दीक्षार्थीतिवचोनिश्चयसुकृतीचारोक्तमुर्वीपति  
 र्यस्येहानयनाययत्नमकरोच्छ्रीमानवन्तिपुरा ॥ गत्वा तपस्यन्तमुपेन्दुपू  
 र्वपुरेतदाश्रीमदवन्तिबर्मा ॥ भृशंसमाराध्यतमात्मभूमिंकथंचिदानीयच  
 कारपूताम् । अथोपसद्याथ चसत्वराशो दीक्षां सदक्षोगुरुदक्षिणार्थम् ॥  
 निवेद्ययस्मैनिजराज्यसारं स्वजन्मसाफल्यमवापभूपः । सकारयामासस  
 मृद्धिभाजं सुनिर्ममः सन्मुनिरत्नभूमिम् ॥ प्रसिद्धमावारिधिमेरुकल्पम्  
 श्रीमत्पुरेभक्तमयूरनाम्नि पुनर्द्वितीयं स्वयमद्वितीयोगुणैर्मुनीन्द्रोरणिभद्र  
 संज्ञकम् ॥ तपोवनश्रेष्ठतमं विधायप्रेष्ठःप्रतिष्ठां परमांनिनाय । आसीद  
 तःकवचपूर्वशिवाभिधानोलोकप्रियः कवचवद्दृढदृष्टशक्तिः ॥ यःसर्वतोव  
 ह्मत्संयतिसंयताश्चोदाहृगुणाह्वामितिकामशरैरभेद्यः ॥ सदाशिवस्तस्य  
 चशिष्यश्चासीत्सदाशिवः सर्वजनस्यशास्ता । तत्पावनं योरणिपद्रनामाप्र  
 साधयामासतपःसमृद्ध्या ॥ अस्मादनल्पादुदयादिकल्पाल्लब्धोदयोस्तब्ध  
 दयेशसंज्ञः । आचार्यसूर्यस्तमसांविदार्यप्रकाम मौदार्यमहार्यवीर्यः ॥  
 निरवधिबर्धतेनचविभर्त्तिपुरोलघुभावमात्मनः । प्रसरतिदिङ्मुखेषुनच  
 लति मनागपिमार्गसंस्थितः ॥ स्फुरतिसमस्तवर्णरचितंनचमुञ्चतिचारु  
 शुभ्रतामलमधुनापियस्य कृतिनोद्भूतमित्यमहर्निशंयशः ॥ यस्यात्मेन्द्रिय  
 निग्रहेनिजगुरुस्थानान्यलंकुर्वतः । प्रीतिं पात्र परिग्रहेचदधतःसाधूपभो  
 ग्याःश्रियः ॥ स्वभ्यस्ताखिलशस्त्रनिर्मलमतेरासीत्सुपाकः परंकीर्त्तैःसोद  
 रपृत्तिमात्ररतिभिस्तृष्णाभिभूतैःकथा ॥ यदिगुणकीर्त्तनमधुनानिःशेषं त  
 स्यसाधुविवृणोमि । तद्वक्तुकीर्त्तिमिमांनावसरः प्रस्तुतात्तदलम् ॥ आचा  
 र्याद्गुरुभाववर्धितगुणानिर्व्यूढवीर्यादयःशिष्यःशिष्यवतां विशेषकइवप्र  
 स्तावमुख्यःस्यताम् ॥ श्रीमान्योमशिवाङ्गयःसमभवत्तस्यापितादृक्पुनः  
 र्यादृग्भूरिभिरित्य मद्भुततमैस्तप्तैस्तपोभिर्भवेत् ॥ स्नाध्यंजन्मजगच्चयेपिदं  
 धतःशेषस्यतस्यक्षमामस्यव्योमपदादि मन्तरचनाख्याताभिधानस्यच ॥ उ  
 ळ्लक्ष्मिबिपदिप्रजां गुरुभरव्यापारदत्तात्मनोयस्योदत्त परोपकारकरुणा  
 मात्रं प्रवृत्तेःफलम् ॥ यस्याचैश्वरितंचिरात्पुलकभद्रगुणस्थलश्रीणिभिर्म

ज्ञव्यञ्जितमन्द्रतारगमकैः संगीयते किन्नरैः । यावच्चन्द्रमसासमं प्रतपतः प्रध्व  
 स्यदूरंतमस्तस्यास्याद्भुतकर्मणः किमपरैस्तोत्रैर्विचित्रैरपि ॥ द्राघिष्ठसद  
 नुष्ठानोन्मदिष्टमितभाषितः ॥ योन्वतिष्ठत्प्रतिष्ठावत्प्रेष्ठः सद्भूतिनां व्रतम्  
 यः संयमस्य नियमस्य नयस्य सन्धक्पुण्यस्य चारुचरितस्य च कीर्तनस्य । एकत्र  
 वस्तुमिति सद्गुणसंयुत)स्य त्वया प्रतिश्रयगृहं गृहिणे वज्रजे ॥ सर्वत्र निर्वृ  
 त्तिकलैकनिरंतरेण लब्धोदयेन च वलेन दिगायतेन । वद्विष्णुनाभिकम  
 लं कृतमेतदिन्दोद्यास्तेन यस्य च गुण(प्रस)रेण विश्वम् । लोकालोकान्तरालम्  
 मणपरिणतावर्णने वा प्रवृत्तिर्वातूलोत्ताललीलाद्भुतगति तुल्यगत्याप्तदिक् च  
 क्रवालः । निर्दूयाशेषविश्वाक्रमणपदरजः पावनैर्वर्तते दमयादाश्च न्यूनान्  
 स्तपसउदगमद्यस्य दूरप्रतापः ॥ येनेदं पुरमापदत्रतमसेमग्रत्रियोगाद्विष्णुः  
 सत्कीर्त्यारणिपद्रुसत्तम चिरादुद्बुध्यत्याश्रमम् भूषणं शिनेव निर्मलत  
 रस्फारस्फुरत्तेजसा सर्वानभ्युदयेन पौरसहितं नीतं पुनस्ताश्रयः ॥ स्फारै  
 र्वाथ हिरण्यरत्ननिर्वहैर्निःशेषमन्तर्वहस्तुङ्गत्तुङ्गतुरङ्गमैर्मंदभरोद्भूतै  
 श्च गर्जद्गजैः ॥ स्वस्थानस्य विशेषं विद्रुतमस्योद्दामलक्ष्मीभृताभूभागास्त  
 पसापुनर्न बरुचः संजज्ञिरे यस्य च ॥ सास्त्राध्यावसतिः स एव विषयस्ते प्रा  
 णिनस्तादिष्टः सद्भूभूमिपतिः स एव किमतस्तेते प्रदेष्टाः परं ॥ यन्वास्ते यम  
 शेषसत्त्वहितकृत्स्नप्रवृत्तः स्वयम् पुण्यानां प्रगुणीतुतौ वनिष्ठजापुत्रो वयु  
 श्चानिव ॥ यद्वाचां मनसां च गोचरमतिक्रान्तेन भूम्नान्नितम् यद्गीतं गुणगर्वि  
 के दिविषदां दानेरदभ्रादरम् ॥ यः सत्त्वोज्ज्वलितैः प्रचण्डतपसां तेजोभि  
 रुन्मीलितं । तन्मन्यत्र चरित्रमुन्नतमनाधत्ते धुनावस्थितम् ॥ पुरा योषित्सङ्गा  
 दनिभृतनिजाक्षं भगवता विजिग्ये यः कामस्त्रिपुररिपुरणा विस्तृत  
 षा ॥ निरूद्धाक्षः क्षान्त्यातमयमजयत्सङ्गरहितः सुचीर्णानां स्याद्वाकिमि  
 ह तपसांदुष्करमिति ॥ स्फारास्फालनवातनिर्दयदङ्गदम्भीरभेरीरवया  
 जेनोज्जगुराकुमारचरितात्सद्ब्रह्मचर्यं तपः ॥ यस्याग्नेयतस्त्रिसन्धमधुत  
 ध्यानस्थिते धूर्जटि मच्चैतन्यो जितवत्तयापि समये सद्भूपवेलोत्सवास्तु  
 त्यस्यात्किमिहास्यनाम चरितन्नयन्तपुण्यार्थिनामावाल्यात्सहकीर्त्तिस  
 म्मिततपस्तेजः समुत्तेजितम् ॥ यस्योच्चैरलधून्नमद्गुणगुणब्रह्माण्डसाडम्ब  
 रये गैर्द्राकृत रुद्र वाहपरिधैः संवार्यते यत्नतः सिद्धान्तोषु महेश्वर्य नि  
 यतन्यायेत्तपादो मुनिर्गम्भीरे च कणाशिनस्तुकलभुक्शास्त्रे स्वयं जैमिनिः ॥  
 साङ्ख्येन ल्यमतिः स्वयंचकपिलोलोकायते सद्गुरुबुद्धो बुद्धमतेजिनोक्ति  
 षुजिनः कोवाथनायं कृती ॥ यद्भूतं यदनागतं यदधुना किञ्चित्काचिद्वर्चते  
 सन्धगदर्शनं संपदातदखिलं पश्यन् प्रमेयं महत् ॥ सर्वज्ञः स्फुट नाभि



मेषकोपिभवानन्यः क्षिती प्राकरेधर्त्ते किन्तु न शान्तधीर्विवमदृ योऽ  
वपुः केवलम् । यस्मिन्तुद्दामधाम्नि प्रचुरतरतपः सोम्विविख्यातनाम्नि  
सर्वानन्द्युक्तसोम्विहिति भृदुरुभग स्पर्द्धिपु व्यदूरिग्णि । सम्प्रप्रेग्णि  
सत्सुख्यशनिहितस्फार सारप्रथिम्निविद्योत्सर्पन्महिम्नित्रिभुवनतिलके  
केगुणाहन्तनस्युः॥ सलीनंमुखवशाक्य करिणामत्यूर्जितं गर्जितंत्रासाद्य-  
स्यगजेन जम्बुक शतेदुर्व्याहृतंसंहृतं ॥ सोढुजातुनजैमिनोयद्वरिणैर्लीला-  
वृतं ऊँकृतंतस्यान्यद्गगने सकाननपतेः किंस्यास्तु तं प्रस्तुतम् ॥ यस्याच्चकै  
स्फुरति सं तमसंनिरस्य तेजः परंप्रति निशंप्रतिवासरंच ॥ अन्यःसर-  
घननुचन्द्रमसोरवेच्चन्द्रावदातचरितः सुतरां चकास्ति ॥ यस्यामलं-  
स्फुरति सद्गुणरत्नवन्दमानन्दकारिजगतां जडताविहीनं । श्रीयोम-  
शम्भुजलधिः सखलुह्यदस्तटष्णसतां समभवद्भुविकोप्यपूर्वः । माधुर्य-  
विनयोनयोनलसतात्यागक्षमा प्रअयःस्थैर्यैर्धैर्यमहार्यवीर्यकलितसद-  
ब्रह्मचर्यतपः । इत्यादिप्रचिनोमिचेतसिचिरयद्यत्किमप्यादरात्तत्सर्वं स-  
मचिंत्यमस्यमहतः कस्यास्तुधत्तांपथि ॥ रेजुःसज्जनरक्तभाव जननान्या-  
सिन्धुवेलावधेश्चित्रयस्यशंसि कुन्दकलिकाकोर प्रभाभांज्यपि ॥ तस्यायं  
खलुदेवतायतनवान्वापीनिवेशस्यशुभःसोद्यानःप्रथतेस्वकीर्त्तिविभवःसा-  
क्षादिवानश्वरः । शिवयुग्ममुमादेवी नाद्येश्वरविनायकौ ॥ समञ्चमन्दि-  
रैरमै । रयमेतान्यचीकरत् ॥ प्रतिक्षपंयाप्रतिविम्बतांगते सुनिर्मलेवारिणि-  
तारकागणे ॥ कुमुदती सङ्गसमूर्जिताप्यलंविभाति विश्वक्कुमुदैरिवाचिता  
प्रसादमाधुर्यनिकामभृद्यंविराजतेयत्रगभीरमम्भःविडम्बयत्सत्कविकाव्य  
वर्गंविसुद्धवर्णाहितचारुशोभम् । शैलात्मजाभक्तिपरप्रयातयासुराङ्गना  
नूपुरसिञ्जितेन । प्रतिक्षणंवाकलहंसनादंभमम्बिधत्तेश्रुतिपेक्षलेन । कृतोद-  
धानावनिताजनानांमुखैर्विचित्रापरपात्ररम्यैःतोयंगतैर्याप्रतिविम्बतेनमु-  
खारविन्देचविभर्त्तिशोभाम् अपूर्वविन्यासविशेषकेणविभूषितायादयि-  
तेवदृष्टा । सोपानमालावलिचारुमध्यानानन्दयत्कस्यमनोमनोऽज्ञा ॥ प्रासा-  
दयत्र भासन्तेकुन्देन्दुकुमुदेज्ज्वलाः ॥ श्रीयोमेशमहीपालयशेवीजाङ्गुरा-  
इव ॥ यानीलकण्ठेनतवोपकण्ठभूतास्यदाधामपरंसुखस्य । प्रासादरम्यार-  
मणीयभूमिः पुरापुरारेःसदृशीचकास्ति ॥ यत्सन्निधौसान्द्रसुवासिताम्भाः  
प्रासादमालानुदिनं विभाति । भयेनभानोःपरिणाममेत्यज्योत्स्नास्थितेवा-  
मरसद्गमूर्त्या ॥ अम्भोनिधिस्तुङ्गतुषारशैलेसम्यग्विराजेद्यदिकूललीनेतेनो-  
पमीयेततदास्फुटंयासमुन्नतैर्नाकि गृहेविभान्ति ॥ अमुक्तमुक्ताफलचा-  
रुकान्तितोयंसदैवप्रतिभातियत्र । अमूर्त्तताराद्यमसोढुकाममुच्चैरभून्न



मिवान्तरिक्षम् ॥ शरन्निधेकामलचन्द्रकान्त्यासरोजलक्ष्म्येवसरोजल-  
 द्विः । अलङ्कृताचारुतयाव्यधत्तयानिर्दृष्टिकस्य न दृश्यमाना ॥ यासर्वदा  
 नोऽभूतियन्निकामंसत्सूपकारचंगभीरतांच । जलैरनल्पैश्चमास्थिता  
 पिफलं तदेतद्विकुलीनतायाः ॥ मृगाङ्गविम्बेप्रतिमांगतायाःस्फुरत्तरङ्गा  
 ङ्गुलिभिर्विलोलैः । सुचारुसौन्दर्यविलोकनायष्टतामलादर्शतलेवभाति ॥  
 स्थिराणिशुद्धानिरुचोज्ज्वलानि निरन्तराण्यार्जवसुन्दराणि सतामनांसी  
 वसदानुकूलंविभान्तियस्याः सुरमन्दिराणिइदन्नभःकिन्द्रवताकुलोस्य  
 किम्बामृततत्कथ मेतदत्र ॥ अहोइदंकिन्वितितर्कयुक्ताजलं न निश्चेतु  
 मलंजनोद्यः । सन्मानभूमिर्भवतुप्रकामंमनोरमोद्यैर्वज्रवारिदाच । त  
 थापिसासाम्यगुणादुदस्ताययाविचित्रारचनांदधत्वा ॥ जितारिषड्वर्ग  
 मनर्थमूलंधर्मेरताः सन्तुसदैवसन्तः ॥ यस्यामितीवाहसुरालयालीनपर्णा  
 यतमन्दनाथ ॥ रङ्गतरङ्गातिमनोरमदूरयाङ्गमम्भोरूपयोधरायाः । दि  
 द्धुक्षिपन्तीशफरीकटाक्षानचूचुरत्याश्रयदशःप्रियेव ॥ यदस्तिकिञ्चित्काचि  
 दप्यकिञ्चिदानन्दहेतुर्जगतीनचस्ता । तदेकदेशेनिखिलंविधाययावेधसो  
 चैर्घटितेवरम्या । कुवलयवतीववापी विभूषयतियदतिसुप्रसिद्धमदः ।  
 चित्रमिदंतुविनिधाय कुवलयमप्यलंकुरुते ॥ स्थिराग्रैषावापीगगन शि  
 खरालिर्भगवतोद्भूताश्चर्योद्युक्तामधिकतपसोभूरियशसः । यदीयाभाती  
 यं शरदमलचन्द्रांशुधवलासुराणां सद्मालीविवकटतटदृष्टेशिखरिणी ॥  
 वापीतडागनिकटेयःपादपरोपयिष्यतिधन्यः शतशपञ्चपातकयुक्तः खलुदु  
 स्तरेनिरये पञ्चैवतेषामिहपातकानिश्शयन्तिवध्वाभ्रशम् ॥ मयैतेरत्यभ्य  
 न्तरेमूढधियोऽरज्यांदास्यन्त्यनार्यावसतिश्चनार्याः । प्रशस्तादेवसंलापपूर्व  
 जत्ताङ्गयेन यान्विताम् शब्दायासामुदसुदत्तमिटदमरादेचदलमुतनघा  
 रङ्गदलेन वर्णितीषपी स्तिकाःरम्याजेज्जाकनोदग्धोदिवानङ्गेणालिखिता ।

*Translation of an Inscription at Ranode.*

Praise be to Shiva who dwelleth in a land where rains perpetually fall, and who is the lord of Paradise, and giver of happiness to mankind \* \* \*, a god most righteous and powerful. \* \* \* Praise be to him to whom sacrifices for propitiation of sins are offered, who keepeth his word, and who dwelleth in Kailas and on whom all Devatas and Asurs attend.

May the injunctions of the conquerer of Tirpora be always your guide.

Padmasan, with implicit faith celebrated a Jag in the delightful forest called Daruban, by means of which he gained the favour of Shiva, who

is pleased only by placing great confidence in him. \* \* \* He prospered by virtue of this holy performance; he attained great power, and his family increased greatly. He was succeeded by a still better person of Muni descent. His name was Surendr; he had a pure heart and possessed great power, and commanded universal respect. His dominions increased daily like the new moon. His son was the most celebrated Kadamhguhambusi, whose son was Rajá Shankhmathikadhipat, whose son was Ambipal. This prince like Mahadev, was a great conqueror of his enemies. From him descended Bhoritapa; his son was Tirath Nath, and from him descended Ram, a prince of great renown. His son was Purandargur, who was as powerful as his father, and who possessed a great inventive genius, and is admired to this day by all learned men for his extensive knowledge and superior talents. He was so shrewd that no lawyer could cheat him of his wealth. His son was Rajanishikhrabharan, the most venerable and praiseworthy man of the time, whose fame shone with equal lustre with the sun. The virtuous and wealthy Rajá Avanti, having heard from his messenger of the unparalleled qualifications of this worthy person, wished to see him before performing the Jag, he was now going to celebrate. Rajá Avanti, the Chattri, went in person to that pious man, and after using every art and entreaty, brought him to Opendrpore, which abounds with Tamal-trees. \* \* \* The wise and well educated Monarch gave charge of his kingdom to him and himself retired to do penance. This most virtuous and pious prince who was as famous as the Sumeru Mountain, and who was the cleverest man of his age, entrusted the management of the government of Mattinagar to Rani Paindr and having retired to a solitary place, passed the remaining days of his life in performing worship. He was venerated by all. To him succeeded Cavach Shiva, who was beloved by all his subjects, and was as strong as armour. He was bold in field, had skill enough to ward off successfully the weapons of his enemy, and had subdued his passions. He was succeeded by his disciple Sada Shiva, a man of great forbearance; when he himself like his predecessor sought retirement. Sada Shiva's son was Sudhdaesh a prince of equal dignity, resembling to mountain Odayáchal. He was so powerful that he destroyed all his enemies, as the beams of the sun remove darkness. He was as generous as powerful. His dominions increased to an astonishing extent. He had not

\* \* \* \* \* His power extended to the remotest parts of the world, he never deviated from the prescribed rules. The fame of that good Monarch shines to this day like the moon. He had control over his passions and thus became an ornament to the seat of his Guru. He preserved peace throughout his reign and kept alliance with those who were worthy of his confidence. His \* \* \* was \* \* \* a man very wise and learned. This prince deserves great commendation, but suffice it to say that he humbled the pride of all his enemies. His excellencies are too numerous to be described in this short sketch. He was succeeded by his disciple Biyom Shiva, a most worthy and able person, and as pious as his predecessor. He acquired universal fame. He was highly forbearing and he was called Biyom Shiva, because he composed many verses in praise of Biyompad (or Vishnu). He gave much protection to his subjects and devoted himself always to the cause of others. His character was so commendable that it was sung by Kumers (celestial choristers.) The fame of that great Monarch spread over the earth like the moon-light. \* \* \* What more should I say in praise of this extraordinary man than \* \* \* He was most pious, and much devoted to worship; he was gentle in his speech and he followed the way of righteousness. He had a perfect command over his passions. He was very punctual in the discharge of his duties. He was a good administrator as well as a virtuous man. His words were very instructive, and all the good qualities were combined in him. \* \* \* Jag \* \* \* He possessed a very large kingdom which increased every day. \* \* \* He was the most excellent person of his time. All his acts were surprising. His dominions extended to all parts of the earth. He had travelled over the whole world and had gained universal applause. He repopulated the long desolated city of Mutmayurpur and made it as flourishing as in the days of Ranipaindr. \* \* \* This city was now repeopled by him and made the seat of his government. He embellished the city with gold and pearls; his beautiful horses \* \* \* and stately elephants. He caused the buildings in the city to be cleaned. This great king with his immense wealth restored that admirable city to its ancient splendour. He superintended himself the construction of the new buildings \* \* \* His pious and glorious actions were admired both by men and gods \* \* \* who had turned away his eye from anger which is contemned by all good men. He was a man



of great forbearance and piety and there is nothing too good to be obtained by those who are always devoted to worship. \* \* \* were so fat that a slap on their haunches produced a sound as loud as that of a trumpet. They were as swift in their motion as the sun. The Rajá was very punctual in the performance of the worship required of a Brumhchari. \* \* \* He had acquired a good name by his generosity and pious conduct. He was a prince of highest repute. He was as beautiful as Indra. The arms of Shiva were his protectors. Mahadev was never so much pleased with any person as with him. He never spoke trifles even when he conversed with his friends. He was of a fair complexion; and was the greatest man of his age. He had a thorough acquaintance with the doctrines of the Buddhist religion, and knew those of the religion of Jains as well as they themselves did. He had knowledge of the past, present, and the future. \* \* \* His outward appearance was such as excited terror, and that famous and pious Rajá (was so bold) that he feared no enemy. He was kind to those who were good; he knew each person's worth, and he deserves great praise for his virtues. He was the mightiest Monarch of his time, and possessed all the qualities of a good man, \* \* \* before the noise of elephants \* \* \* like the deer and jackals \* \* \* could stand or endure \* \* \* His talents shone with equal splendour in day and night, and his renown spread over the world like the moon-light. That excellent prince was adorned with a garland of all virtues that a man can possess. \* \* \* There never was a man superior to him in any respect in this world. He was very submissive, just, energetic, mild, wise, brave and pious. \* \* \* He had gained popular applause. Many Baolis, magnificent buildings, gardens \* \* \* temples in honor of Shiva, Parvati, Nandishor and Ganesh were constructed by him. The water of the Baolis was so pure that the shadow which the stars reflected in it seemed every night like Kumud flowers, and the ornaments which adorned the feet of those women who came to bathe there made a noise like that of a swarm of geese. The image of women that looked into the water was seen in it as clear as a lotus flower. The Baolis were adorned like a beautiful woman with every kind of embellishment, and every person that looked at their steps was highly pleased. They were the monuments of this Rajá's greatness \* \* \* \* In that pleasant land, and in those splendid buildings the Rajá lived like Mahadev. The



lofty buildings which surrounded those Baolis prevented the sun's rays from reaching the surface of water in them, and it appeared as if the sun was ashamed to show its face to that pure water. They were so magnificent that you would suppose them to be the dwelling of gods. They were as cool as celestial habitations which are refrigerated by the gentle breeze of the sea. \* \* \* The buildings which were on the banks of the river were as splendid as the moon, and the surface of the water in that river was covered with lotus flowers. \* \* \* It never left \* \* \* in all seasons it was very deep. \* \* \* The moon shone very beautifully on its rapid streams, and resembled a mirror. The temples were as free from impurities as the hearts of gods are pure from all vice. \* \* \* In the river there were all kinds of fish. \* \* \* That victorious Rajá who had subdued all his passions, used to live in those palaces. \* \* \* They were more beautiful than women who are adorned with all kinds of ornaments, and the Raja had made this city the museum of all the curiosities of the world. \* \* \* It is well known that Baolis are usually embellished by kumud flowers, but these Baolis were so beautifully constructed and ornamented that kumud flowers owed their beauty to them. \* \* \* This Rajá was as glorious and powerful as the gods. The Hill of white stones which shone like the moon in the cold season derived its beauty from the occasional visits of this Monarch who had planted numerous trees (on it.) He conquered all his enemies. \* \* \* This city \* \* \* was repopulated by him.

The writer of these verses was \* \* \* and the person who transcribed them on this stone was Anrudh.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR SEPTEMBER, 1847.

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The regular monthly meeting of the Asiatic Society was held on Wednesday evening, the 1st. September, 1847.

The LORD BISHOP, in the chair.

The minutes of last meeting were read and confirmed, and the accounts and vouchers for August laid on the table as usual.

The following gentlemen were ballotted for and duly elected members of the Society :—

Dr. Lamb, Superintending Surgeon.

Gilson R. French, Esq.

William McDougal, Esq.

*Major Waugh*, the Surveyor General of India, was named for ballot at the October meeting; proposed by B. H. Hodgson, Esq., seconded by Dr. W. B. O'Shaughnessy.

In consequence of the absence of Major Marshall, his notice of motion, that all sections and committees of the Society be authorized to elect their own Secretaries, was not brought forward.

Read letters from H. M. Elliott, Esq., Secretary to the Government of India, Foreign Department, accepting Mr. Frith's offer to join the Thibet Mission.

From H. M. Elliott, Esq., Secretary to Government of India Foreign Department, promising to forward Lieutenant Strachey's narrative of his tour in the lake districts of Manasarowar and Rakas Tal.

From Major Anderson, C. B., Ishapore, forwarding a paper on the route of the Chinese traveller Hiuan 'Thsang.

From Mr. Logan, Singapore, with a paper on Lamination and Laminar Coloration accompanying Iron-masked Walls in the Sedimentary Rocks of Singapore, &c.

From B. H. Hodgson, Esq., on the Tame Sheep and Goats of the sub-Himalayas and Thibet.

From Capt. William Munro, announcing his retirement from the Society in consequence of his departure to England.

From H. Cope, Esq., forwarding, on the part of the Archæological Society of Dehli, a memoir by Messrs. Cope and Lewis "on the Town and Palace of Feerozabad, in the vicinity of Dehli."

From Capt. Kittoe, on the route of Fa Hian through the Province of Behar.

From Baboo Nrendernath Tagore, Honorary Secretary to the Tuttwabodhini Sabha, presenting a copy of the first Kulpa of the "Tuttwabodhini Patrika."

From Baboo Debendernath Tagore, forwarding a Buddhistical image recently exhumed in the vicinity of the Temple of Tribeni, near Hooghly.

On the part of the Council of the Society the Secretaries submitted their unanimous recommendation—that Capt. William Munro, be elected an Honorary member of the Society, as a tribute of their sense of the zeal and success with which he has applied his varied scientific attainments to numerous enquiries of general utility during his late service in India.

That Capt. Munro's report on the Timber Trees of Bengal be forwarded to the Millitary Board, as that of the Asiatic Society, with the due acknowledgment of the valuable aid Capt. Munro has afforded, also that the Report be published in the Journal.

A letter having been received by Mr. Laidlay from Colonel Sykes, announcing that the Court of Directors had sanctioned the immediate publication of the Rig Veda in London, to be edited by Dr. Muller, with a translation by Professor Wilson, at an expense of Rs. 40,000, the Council felt it to be their duty to direct the immediate suspension of all outlay on the edition of the same work recently sanctioned by the Asiatic Society of Bengal under the editorial management of Dr. Roer.

With this resolution Dr. Roer at once complied, and addressed the subjoined letter to the Council, recommending that instead of the Rig Veda the Society undertake to publish the Sanhita of the Yajus Veda, one of equal importance.

*Extract of a letter from COL. SYKES, dated "India House," 2d July, 1847.*

"The views I propounded in my notes upon Ancient India, are making some progress on the continent. Monsr. Manfried, in his recent work, "*Essai sur l'origine des principaux Peuples Anciens*" has adopted, with few exceptions, the whole of my opinions; and justifying his adoption upon logical deductions. We shall presently, I suspect, have further reason to acknowledge the soundness of some of these opinions in the revelations of the Rig Veda, the text of which the Asiatic Society will be glad to learn, the Court of Directors have authorized to be published, together with an English translation, at the expense of £4000. The Editor is a very profound Oriental Scholar, although a young man, Dr. Max Muller. His labours will extend over a period of five years."

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TO DR. W. B. O'SHAUGHNESSY,

*Senior Secretary, Asiatic Society,*

*Dated Asiatic Society, the 27th August, 1847.*

SIR,—I have the honour to acknowledge the receipt of your letter, dated the 20th instant, and in reply to report to you for the information of the Committee of Papers, that in compliance with their instructions I have put an immediate stop to the progress of the work relative to the proposed edition of the Sanhita of the Rigveda, and that in the course of this month I shall submit to the Society the portion that has been completed.

As it is not stated in the letter of Col. Sykes, that a commencement of the edition has been made in London, I beg to submit it to the Society, whether they think fit to place as much of the text and commentary, as is ready for the press, after having passed the Oriental Section, at the disposal of the Honourable the Court of Directors.

Although under the circumstances set forth in your letter, I fully agree with the propriety of discontinuing the printing of the Rigveda, yet I do not perceive a reason why the printing of this Veda at home should induce the Society entirely to give up an undertaking into which they have embarked before the eyes of the literary world, and of which the difficulties have been now for the greater part overcome.

The Sanhita of the Rigveda is but a small portion of the Vedas, a complete edition of which requires the united energies of many colabourers. I would



therefore suggest to the Society to go on with their work, and to publish within the space of five years in which the Sanhita of the Rig will be printed in London, another part of the Vedas, for instance, the Sanhita of the Yajur, which is of equal importance. Thus the wishes of the Directors and the learned public would be gratified, two parts, instead of one, of the important work at once appearing, and we would at the same time redeem the pledge which the Society for a long time has owed to the Directors. In conclusion I beg to draw the attention of the Society to the circumstance, that an edition of the Vedas in India possesses an advantage which is altogether wanting in Europe. Even the most distinguished scholar has to make a new study for the Vedas to master their language and grammar, but while in Europe he is limited to his own resources, he can here at every stage of the work avail himself of the assistance of Pundits, by which, to say the least, the publication must be greatly accelerated.

I have the honour to be, Sir,

Your most obedient Servant,

E. ROER,

*Co-Secretary, Asiatic Society, Oriental Dept.*

The Council regarding this proposal as deserving attentive consideration, recommended that the Oriental Section be solicited to report upon it at their earliest convenience for the information of the Society.

Dr. Roer also having most liberally proposed to place as much of the text and commentary of the Rig Veda as he had already prepared for the press, at the disposal of the Hon'ble the Court of Directors, the Council recommended Dr. Roer's offer for the acceptance and thanks of the Society.

Some discussion ensued as to the expediency of discontinuing the preparation of the Rig Veda on the unofficial communication above referred to.

It was observed, that having commenced in this country where greater facilities for accuracy and expedition existed, a text and commentary with translation, after much delay and application of the Oriental funds to other general uses of the Society, it must be desired not too hastily to drop the task, except with the exact knowledge of what was doing and wished to be done by the Home authorities.

Accordingly, on the proposition of Mr. Bushby, it was carried by a majority, that pending the reply to an immediate reference to the India

House, Dr. Roer be requested to proceed with his Edition of the Rig Veda.

Reports having been received from the Curators and Librarian in their several Departments, the meeting adjourned.

#### LIBRARY.

The following books have been received since the last meeting :

#### PRESENTED.

Rudimens de la Langue Hindoui ; par M. Garcin de Tassy. Paris, 1847.—  
BY THE AUTHOR.

Proceedings of the Zoological Society of London, for the year 1838.—By  
E. BLYTH, Esq.

The Journal of the Indian Archipelago and Eastern Asia, No. I.—By  
J. R. LOGAN, Esq.

The Oriental Baptist, No. IX.—BY THE EDITOR.

Upadeshak, No. IX.—BY THE EDITOR.

The Oriental Christian Spectator, No. VIII.—BY THE EDITORS.

The Calcutta Christian Observer, for August, 1847.—BY THE EDITORS.

Meteorological Register kept at the Surveyor General's Office, Calcutta,  
for the month of July, 1847.—FROM THE SURVEYOR GENERAL'S OFFICE.

Record of cases treated in the Mesmeric Hospital from November 1846 to  
May 1847, with Reports of the Official visitors, (two copies.)—BY THE BEN-  
GAL GOVERNMENT.

Le Moniteur des Indes—Orientales, et Occidentales, Tome II. No. II.—  
BY THE EDITOR.

#### EXCHANGED.

Calcutta Journal of Natural History, No. 29.

The London, Edinburgh, and Dublin Philosophical Magazine, No. 203-4.

Journal Asiatique, Nos. 41-2.

The Athenæum, Nos. 1023-4.

#### PURCHASED.

Journal des Savans, Avril et Mai, 1847.

Ferguson's Latin Dictionary.

Meadows' French Dictionary.

*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Sept. 1847.*

| Days of the Month. | Maximum Pressure observed at 9h 50m. |              |       |             |             | Aspect of the Sky.     | Minimum Pressure observed at 4 p. m. |              |       |             |             | Aspect of the Sky. | Ram Gauges. |                      |            | Moon's phases. |
|--------------------|--------------------------------------|--------------|-------|-------------|-------------|------------------------|--------------------------------------|--------------|-------|-------------|-------------|--------------------|-------------|----------------------|------------|----------------|
|                    | Barometer reduced to 32° Fahr.       | Temperature. | Wind. | Of the Mer. | Of the Air. |                        | Of the Mer.                          | Temperature. | Wind. | Of the Mer. | Of the Air. |                    | Of the Mer. | Maximum Temperature. | Upper Feet |  | Lower Feet | Elevation. |
| 1                  | In. 29.679                           | 90.0         | 86.8  | 81.9        | E.          | Cumulo strati.         | In. 29.591                           | 84.5         | 84.8  | 81.0        | S. E.       | Cloudy.            | 90.7        | 0.08                 | 0.14       |                |
| 2                  | 674                                  | 87.8         | 85.5  | 80.8        | S.          | Cloudy.                | 614                                  | 85.2         | 84.9  | 80.3        | S.          | Ditto.             | 90.4        | 0.80                 | 0.87       |                |
| 3                  | 653                                  | 87.4         | 86.5  | 82.0        | S.          | Cumuli.                | 515                                  | 86.0         | 85.0  | 81.6        | S.          | Nimbi.             | 90.3        | 0.13                 | 0.20       |                |
| 4                  | 593                                  | 89.5         | 86.9  | 81.9        | S.          | Cumulo strati.         | 479                                  | 88.5         | 87.4  | 82.0        | S. E.       | Cloudy.            | 93.5        | 0.05                 | 0.12       |                |
| 5                  | 593                                  | 90.0         | 88.4  | 82.4        | E.          | Ditto.                 | 493                                  | 88.8         | 87.0  | 82.3        | S. E.       | Ditto.             | 93.0        | ..                   | ..         |                |
| 6                  | 590                                  | 90.0         | 87.7  | 82.0        | E.          | Cumuli.                | 473                                  | 89.0         | 87.8  | 80.8        | E.          | Ditto.             | 92.9        | ..                   | ..         |                |
| 7                  | 583                                  | 90.5         | 88.4  | 81.8        | E.          | Cloudy.                | 478                                  | 83.5         | 83.0  | 80.0        | E.          | Ditto.             | 91.0        | ..                   | ..         |                |
| 8                  | 605                                  | 88.6         | 87.0  | 82.0        | E.          | Ditto.                 | 505                                  | 89.0         | 87.4  | 81.3        | S. E.       | Cumulo strati.     | 91.3        | 0.06                 | 0.13       |                |
| 9                  | 670                                  | 86.5         | 86.2  | 82.0        | E.          | Ditto.                 | 542                                  | 91.0         | 90.0  | 80.8        | S. E.       | ....               | 92.4        | ..                   | ..         |                |
| 10                 | 675                                  | 86.1         | 85.5  | 80.0        | S. E.       | Cumulo strati.         | 517                                  | 87.0         | 85.0  | 80.8        | N.          | Cumulo strati.     | 92.5        | 0.21                 | 0.28       |                |
| 11                 | 635                                  | 90.5         | 88.8  | 82.0        | S. E.       | Ditto.                 | 593                                  | 91.5         | 88.7  | 79.4        | S. E.       | Cloudy.            | 93.8        | ..                   | ..         |                |
| 12                 | 663                                  | 90.0         | 89.0  | 80.8        | S. E.       | Ditto.                 | 623                                  | 78.0         | 78.2  | 76.0        | N.          | Drizzly.           | 92.8        | 1.84                 | 1.98       |                |
| 13                 | 707                                  | 89.2         | 89.0  | 82.5        | E.          | Ditto.                 | 584                                  | 87.0         | 86.0  | 80.8        | S.          | Cloudy.            | 93.8        | 0.26                 | 0.32       |                |
| 14                 | 695                                  | 87.0         | 86.0  | 81.0        | E.          | Cloudy.                | 520                                  | 85.0         | 84.2  | 80.1        | N. E.       | Cloudy.            | 91.0        | 0.98                 | 1.09       |                |
| 15                 | 648                                  | 85.4         | 85.0  | 81.4        | N.          | Ditto.                 | 478                                  | 80.8         | 81.0  | 79.0        | S.          | Nimbi.             | 86.5        | 0.10                 | 0.18       |                |
| 16                 | 551                                  | 86.0         | 84.0  | 80.5        | E.          | Rain.                  | 478                                  | 80.8         | 81.0  | 79.0        | S.          | Cloudy.            | 87.8        | 1.14                 | 1.28       |                |
| 17                 | 630                                  | 81.8         | 81.3  | 79.4        | E.          | Cloudy.                | 520                                  | 86.5         | 84.2  | 80.5        | S.          | Cumulo strati.     | 88.5        | 0.22                 | 0.31       |                |
| 18                 | 683                                  | 85.0         | 84.9  | 79.5        | W.          | Cirro cumuli.          | 585                                  | 88.0         | 87.0  | 80.8        | S.          | Cumuli.            | 88.1        | ..                   | ..         |                |
| 19                 | 762                                  | 82.0         | 82.3  | 77.4        | S.          | Cloudy.                | 674                                  | 88.5         | 86.6  | 80.0        | S. W.       | Cumulo strati.     | 93.0        | ..                   | ..         |                |
| 20                 | 830                                  | 90.0         | 87.8  | 81.2        | S.          | Cumulo strati.         | 728                                  | 87.5         | 85.0  | 79.0        | S.          | Cumulo strati.     | 92.4        | ..                   | ..         |                |
| 21                 | 827                                  | 89.0         | 88.0  | 81.0        | S.          | Ditto.                 | 678                                  | 91.8         | 89.0  | 80.8        | N.          | Very cloudy.       | 93.3        | ..                   | ..         |                |
| 22                 | 808                                  | 88.5         | 86.5  | 80.0        | S.          | Ditto.                 | 686                                  | 91.8         | 89.8  | 80.0        | S.          | Cumulo strati.     | 93.3        | ..                   | ..         |                |
| 23                 | 842                                  | 89.0         | 88.0  | 82.5        | S.          | Ditto.                 | 721                                  | 86.4         | 86.5  | 79.0        | S.          | Ditto.             | 92.0        | 0.12                 | 0.18       |                |
| 24                 | 858                                  | 85.8         | 85.0  | 80.2        | S.          | Ditto.                 | 725                                  | 83.8         | 84.0  | 79.8        | S.          | Cloudy.            | 91.9        | 1.97                 | 2.00       |                |
| 25                 | 815                                  | 88.7         | 87.9  | 81.2        | S. W.       | ....                   | 734                                  | 85.0         | 84.8  | 79.8        | S.          | Cumulo strati.     | 90.8        | ..                   | ..         |                |
| 26                 | 815                                  | 88.7         | 87.9  | 81.2        | S. W.       | Cumulo strati.         | 706                                  | 90.7         | 88.4  | 79.8        | W.          | Cloudy.            | 93.8        | ..                   | ..         |                |
| 27                 | 778                                  | 91.0         | 89.0  | 83.0        | E.          | Ditto.                 | 642                                  | 91.0         | 89.5  | 81.1        | S.          | Ditto.             | 92.0        | 0.52                 | 0.61       |                |
| 28                 | 803                                  | 86.2         | 86.0  | 84.0        | N. E.       | Cloudy (Cirro cumuli). | 646                                  | 85.0         | 83.5  | 78.0        | S. E.       | Cirro cumuli.      | 88.1        | ..                   | ..         |                |
| 29                 | 801                                  | 86.0         | 84.1  | 79.2        | E.          | Cloudy.                | 654                                  | 90.0         | 87.5  | 77.0        | E.          | Cumulo strati.     | 90.0        | ..                   | ..         |                |
| 30                 | 746                                  | 80.5         | 81.0  | 78.0        | N. E.       | Ditto.                 | 642                                  | 78.5         | 78.0  | 77.0        | S.          | Rain.              | 85.0        | 1.23                 | 1.26       |                |
| Mean               | 29.704                               | 87.5         | 86.3  | 81.1        |             |                        | 29.598                               | 86.8         | 85.7  | 80.0        |             |                    | 91.7        | 9.71                 | 10.95      |                |

# JOURNAL

OF THE

# ASIATIC SOCIETY.

NOVEMBER, 1847.

*Report on the Timber Trees of Bengal,\* by Capt. MUNRO, F. L. S.*

I know of no better mode of supplying, as far as may be in my power, the information required relative to the timber trees of India, than by making a catalogue of the best of them, appending such remarks to each, as my own experience and reading may enable me to supply.

1. TEAK—*Tectona grandis*, Nat. Fam. *Verbenaceæ*. Generally known to the natives as *Saguan* or *Segoon*, although in central India two or three other trees are also called by the same name. The Teak when in flower is very pretty, and being so commonly cultivated nearly all over India, is known to most Europeans. Although it thrives to my own knowledge in almost every portion of Hindoostan, it attains perfection in a few favored localities only. The Teak forests of Malabar, are well known. They are very extensive, and produce according to experiment finer teak timber than any other forest. The trees generally grow in low hills of about 1 to 3000 feet elevation above the sea. Moulmein is also noted for its teak. I have seen large forests of the tree in Nagpore, and near the Nerbudda, the wood is very much used in that part of the country, and appears to be of a very superior description. In the Metcalfe Hall there is a very good specimen of Teak grown in the Botanical Gardens, which has been worked up into a table and presented to the Society, by the late Mr. Robison. From experiments carried on by Capt. Baker, and detailed in the 1st Volume of "Gleanings in Science," it would appear that Rangoon, Bombay, and

\* Drawn up by Capt. Munro, at the request of the Asiatic Society, for the information of the Military Board.



Pegue Teak were almost of the same strength, but are far surpassed by the Malabar Teak. Captain Baker's experiments, which will be constantly referred to, were carried on with specimens of wood two inches square and 6 feet long. In these trials the average weight, required to break the Malabar Teak, was 1070 lbs. whilst the other kinds broke with an average of 870 lbs. The extremes in these trials are very remarkable, indicating a very great difference in the value of different specimens of the same timber. The specimen from Rangoon, breaking with 654 lbs. and another from Malabar required 1162 lbs. Teak will not bend so much as Sál or Soondree, and breaks with about the same weight as Sál. It is therefore easy to determine for what purposes Teak is best adapted. It is used, as is well known, for an infinite number of purposes in India. The experiment made by Capt. Baker, differs much from the results of Major Campbell's experiment at Cossipore, as detailed in the Transactions of the Society of Arts. The Malabar specimen seems to have been a bad one, but as many of the other specimens were from unseasoned wood, they are not so much to be depended on.

2. GHUMBAR, GOMAR or GHUMBARRE—*Gmelina arborea*, Linn. —This belongs to the same natural family as the Teak, and is indeed very closely allied to that wood in appearance, with the grain rather closer, although much inferior in strength and elasticity. The best specimen broke with Capt. Baker, with 580 lbs. and the worst with 500. It is a common tree in most parts of India, generally found on hills about 2000 feet in height. It also grows in the Soonderbunds. The timber is supposed to resist water and worms better than Teak. As it will not bear much stress, it is commonly used for light work, such as the cylinders of drums, carriage panels, decks of budgerows, and turnery. Although more durable than many woods, and not subject to warping, it can scarcely be called a valuable timber, and from its resemblance to Teak, might be used in mistake for that wood, where serious consequences would ensue.

3. DHAMUM or DANGAN.—This was discovered by Mr. Griffith to be an undescribed species, and was called by him *Hemigymnia macleodii*. Of the same order with the Teak, it is very dissimilar in its great elasticity. I am not aware of any other locality for its growth than the forest about Sconie, between Jubbulpore and Kamptee. The tree has a peculiar appearance, and can be distinguished at a long dis-

tance in the jungle. I have seen excellent fishing rods made out of it, and good-sized timber could be at times procured. I believe the timber to be excellent, but, as according to our present information, it grows at such a long distance from water carriage, except by the Ner-budda, it cannot be looked upon as likely to be of much consequence in commerce. I imagine from observation the tree to be of slow growth, and that it would require 30 years to come to perfection, if it should be thought desirable to encourage its cultivation on the low hills which approach the Ganges. There is no good specimen of the wood in the collection of the Horticultural Society, and it would be very desirable to procure one.

4. and 5. There are two other woods of this family produced in Goalpara, CHIKAGHUMBAREE,—*Premna hircina*, and BUKDHOLI, *Premna flavescens*,—which from Mr. Kyd's experiments would appear to be very durable woods, but are not I believe, possessed of any other valuable properties.

6. SÁL—*Vateria robusta*, W. and A.—*Shorea robusta*, Roxb.—N. F. *Dipterocarpeæ*.—I believe I am right in saying that every tree belonging to this family is a valuable one, most probably, from all containing a considerable quantity of a resinous juice, which is called in the various trees, *Dammar*, *Wood-oil*, *Gum Anime*, *Piney varnish*, *Ral*, *Dhoona*, &c. These trees are all fine ones, and in the forests of Malabar attain a stupendous height. In the Ghauts of Cong and the Neelgherries one kind is generally known to Europeans as the Buttress tree, and from growing within a short distance of the sea, with water carriage from the foot of the mountains by the Calicut River, thus offers a supply of the most valuable timber for some time to come. The Sál itself is probably the best timber in India. Of 10 experiments of Capt. Baker, the mean weight required to break the wood was 1238 lbs., and one specimen required 1304. The tree is found in great abundance in the Murung forests and in the whole belt of forest at the foot of the Himalayas, frequently growing, as the Teak does, over a great extent of ground unaccompanied by any other tree. The Calcutta market is abundantly supplied with the timber, principally I believe from Gorrukpore. It is undoubtedly a very valuable wood for house building, and for many parts of gun carriages, and indeed for almost all purposes on shore, where very strong tough wood is required. It is heavy, the specific gravity

being upwards of 1,000, whilst Teak is about 720. The Camphor tree of Sumatra is closely allied to the Sál. Two species of *Dipterocarpus* (of the same family) under the native names of MEKAI and HOO-LUNG, are mentioned by Capt. Hannay and Mr. Masters, as producing fine timber in Assam.

7. TOON—*Cedrela toona*, Roxb. This, with the Mahogany, Satin wood, Rohunna and Chittagong wood, all belong to the same natural family, *Cedrelaceæ*, affording very valuable timber. The Toon is a favorite wood with the carpenters of India, and works out very prettily; the tree has a wide range in the Peninsula of India, and generally throughout Nagpore, Bundelkund and the lower ranges of the Himalayas. It is a very beautiful tree, and now adorns the sides of roads in every part of Bengal, particularly at Bhaugulpore and Monghyr. 800 lbs. broke the specimen used in Capt. Baker's trials, and its specific gravity is 640. Captain Hannay describes three varieties of Toon in Assam, under the names of Hindooree Poma, and Seekha Poma, and says that although light, when once seasoned, it is very durable, and some splendid boats are formed of it, particularly in the Dihong river where it would seem to be in great abundance. It is mentioned by Lieut. Nuthall as one of the woods of Arracan, under the name of Thit-ka-do.

8. MAHOGANY—*Swietenia mahogani*, Linn.—This of course is only known in India in its cultivated state, and sufficient has been done to show that it can be grown with great success. The Horticultural Society are in possession of beautiful specimens that have been worked up from trees grown in the Botanical Gardens, and which are supposed to have been 43 to 44 years old, when felled. The cultivation of the tree ought to be encouraged as much as possible in the lower hills, for even in its native country the quality depends very much on the situation where the trees grow. On elevated rocky places, where there is but little soil, the wood is always of a better grain and superior texture, whereas in low alluvial situations, however vigorous and luxuriant the plant may be, the quality of the timber is always inferior, more light and porous, and of a paler color. Mahogany is said to be almost indestructible by worms or in water, and to be bullet-proof. Capt. Franklin took with him to the polar seas boats of Mahogany as being the lightest in consequence of the thinness of the planks, combined with great strength.



9. **ROHUNAH** or **ROOAH**—*Soymda* (*Swietenia*) *febrifuga*, Roxb. It is also called *Kukhut Rohida* in the Nagpore jungles. I am not aware that this tree is found in Bengal, but it is very abundant in Nagpore, and also in southern India. I have had at Kamptee abundant opportunities of trying the strength and value of the timber, and believe it to be one of the best in India. It takes a high polish, and from its fine red color is peculiarly adapted for furniture. There are specimens in the collection of the Horticultural Society, of the wood sent from the Jungle Mehals.

10. **CHICKRASSEE** or **CHITTAGONG WOOD**—*Chickrassia tabularis*, C. I. This wood appears to be very abundant in Chittagong and in southern India, but I am not aware that it is applied to any other purpose than cabinet making, for which it is admirably adapted. According to Mr. Masters, this tree is known in Assam by the same native name as the Toon, namely Toona.

11. **BILLOO**—*Chloroxylon swietenia*—The satin wood. It is generally found in company with the *Rohunna*. It is however much rarer, but is deserving of greater attention than has been yet paid to it.

12. **SOONDREE**—*Heritiera minor*.—This tree, which furnishes a great portion of the firewood of Calcutta, belongs to the natural family of *Sterculiaceæ*, in which almost all the woods are very perishable, and indeed in one tree, the *Adansonia*, which far surpasses in size any that we are acquainted with, the wood perishes into dust within 12 months of the felling of the tree. However, the Soondree, from Capt. Baker's experiment, appears to be the strongest and toughest wood he tested. The mean of five experiments gave 1312 lbs. for breaking. The specific gravity is much the same as Sál, 1030. Soondree is very generally used in Calcutta for buggy shafts, and is well adopted for all temporary purposes where strength and elasticity are required. It is also used for boats, boat masts, poles and spokes of wheels. I imagine the Soonderbunds derive their name from this tree.

13. **SISSOO**—*Dalbergia sissoo*, Roxb.—This, with *Dalbergia latifolia*, *Sitsál* or Black wood; and *Dalbergia emarginata* or *Andaman Sissoo*, all belonging to the same genus, composes a portion of the nat. family *Leguminosæ*, notorious for its timber trees, some of which in America, according to Martius, attain the gigantic size of being at the bottom 84 feet in circumference, and 60 feet where the tree becomes



cylindrical. If Sissoo was a more durable wood than it is supposed to be, it would be the most valuable wood in the country. It is very strong, requiring a mean of 1102 lbs. to break it, is very elastic, and has a specific gravity nearly the same as teak, 724. The timber is seldom straight, and is therefore not well adapted for beams, but is much employed for furniture, ship building and other purposes, where curved timber is required. It is not proof against white ants. The tree is found all over this Presidency either cultivated or in its native jungles, but is rare in southern India. *Kunkur* appears to be prejudicial to it, for in the neighbourhood of Agra, as soon as the roots reach the *Kunkur*, the tree which up to the time had been quite healthy, suddenly dies off. The Calcutta climate seems to agree very well with the Sissoo, as there are some magnificent trees in the neighbourhood.

14. SIT SAUL—*Dalbergia latifolia*.—This is called Black wood and Rose wood, and sometimes when well worked is fully equal to the finest description of the Rose wood of commerce. The tree attains a larger size in southern India than it does in these provinces, and the wood is more commonly used there. The tree is common in central India and also, I believe, in Assam. I imagine the "black rose wood" mentioned by Capt. Baker to be this wood, and if so, its specific gravity is 875, and it required 1196 lbs. to break it. It is a remarkable fact that up to this date it has not been ascertained to what tree we are indebted for the "Rose wood" of commerce.

15. PEET SAL—*Pterocarpus marsupium*. This with *P. santalinus*, red sandal wood, and *P. dalbergioides*, Andaman red wood, are those magnificent timber trees of which very fine specimens are to be seen in the Botanical gardens, and also in the Barrackpore Park. The most prettily shaped tree in the Park is *P. marsupium*. *P. dalbergioides* flowers in the gardens in July and August, and spreads its delicious fragrance from a long distance round. One tree is a most superb one, out-topping nearly every tree in the garden. The two other species are abundant in the jungles of central and southern India. *P. marsupium* is believed to produce a variety of the Gum Kino. It is universally known in central India as the Hyissar, and is a very strong, tough and durable wood, perfectly impervious to insects of any kind. From its waved grain it makes very handsome furniture. Its good

properties seem to be valued by the natives of Nagpore only. There is no specimen of the wood that I know of in Calcutta, but it can of course be easily obtained. I have made very numerous trials of this wood and am of opinion, that it is the best wood in India, combining as it does strength, lightness and beauty, and it is easily procurable of very large dimensions. I have seen it very generally used for door and window frames, but it is curious to observe that the plaster in its proximity always becomes more or less stained with a red colour. The finest trees I observed in their native jungles, always grow in the stony bed of nullahs, a favorite locality of many leguminous trees.

16. SERISS—*Acacia serissa*. This genus also contains *A. arabica*, BABUL, and *A. catechu*, KAIRA, producing timber. The Seriss is a dark coloured very hard wood, approaching Sissoo in appearance and properties, but with the advantage of not being so liable to injury from insects. It is heavier than Sissoo and broke with 709 lbs. and is not quite so elastic. It is a fine handsome tree, and to be found all over India growing in the plains. The wood is principally adapted for furniture.

17. BABUL—*Acacia arabica*. This is a very useful, strong, tough timber, used for knees and crooked timbers in ship building, for the axles of country carts, handles of mallets and various agricultural implements, and indeed for all purposes where very tough small plain wood is required. If it attained to any size, it would be extremely valuable. The tree grows well in every soil and is well known to every person who has travelled in India.

18. KHERI, KAIR, KAIRA, KOROI—*Acacia catechu*.—This tree is known, wherever I have been in India, by some slight variation of the words I have given above. It is more valuable than is generally supposed, and when a large tree can be obtained without much of the outer light coloured wood, it is an excellent timber. It is very hard and turns very well, being quite as close in grain as box, kingwood, and other fancy woods which command a very ready and remunerative sale in England. The tree is very widely spread over India, and seems to grow well even in the poorest soils. The timber described as *Kerdun*, or *Keerra* from Chota Nagpore, and so favourably reported on by Major Goodwyn, most probably is the same. Capt. Tickell, in forwarding the specimens, says:—"It works easily and smoothly, does not chip or

crack by the weather, and the grain is so fine that the smallest work with the highest polish could be done in it."

19. **KENDOO**—*Ebony*. There are several kinds of Ebony in India ; in fact there is no part that does not contain at least two or three different species of *Diospyros*, all of which produce more or less black wood, but *D. melanoxydon* is superior to any other. I imagine there is no wood more durable than Ebony, and no insect can do it any harm. I refer only to the heart of the tree ; the outside wood which composes the largest parts of many trees, is attacked immediately by all kinds of insects. In central India, where the Ebony grows to a large size and is very commonly used for beams in houses, a large tree is cut down, and left for a year, when it will be found with all the light coloured wood eaten away, and the hard and durable Ebony alone left ; carpenters are very loath to use the wood, as it injures their tools very much, and with many the fine particles which come off in the working, cause intolerable sneezing. Every one is aware of the beauty of Ebony if well polished, but few perhaps imagine that it is to be procured in such abundance as it is. It is to be found in every jungle of India.

**ABLOOYA, KYAN, GAB, OORIGAB**—Are all well known native names for different species of good useful Ebony. All these trees are species in the neighbourhood of Calcutta, and some very fine trees of the Kyan, *Diospyros tomentosa*, occur at Allipore. The Gáb is known and used as a paying substance for boats by all natives—and it will very probably be found that *Gutta Percha*, which in time must become one of the most valuable exports from the straits of Malacca, is a species of *Diospyrus*.

20. **JAROO**L—*Lagerströmia*. This is the pretty tree that so ornaments most of our woods with its beautiful light purple flower in June. There appears to be very various opinions regarding the merits of the wood as such, which while one variety is strongly recommended, another is equally strongly condemned. It is therefore necessary to be very cautious in using it. Capt. Baker writes of red Jarool as a fine wood growing to a great size in Chittagong, but brought to the Calcutta market too small to be of much use except for picture frames and other similar purposes. The Chittagong forests are said to be nearly cleared of the best, a thorny species of Jarool,—the others are of little value. It



is considered a valuable wood in ship building. Hamilton describes it as growing of 6 feet girth in Goalpara, much used in building, but soft. Capt. Hannay, in describing the wood in Assam, says it is well known at Dacca and is admirably adapted for that portion of boats under water; well seasoned, it is a good wood. The Jarool is very scarce. I have seen the tree growing to a great size in the forest of Malabar, where it is not much esteemed.

21. ASSUN—*Terminalia tomentosa*. W. and A.,—Arjun, Arjuna, W. and A.—*T. bellerica*, *T. calappa*, &c. &c. are all light coloured tough useful timber, not very ornamental, but often for their great size very useful. Hari is a common name of the different species amongst natives. They are to be found all over India, and generally valued where they grow. Roxburgh mentions one species as growing to such a size as to be made into solid wheels for Buffalo carts. The Assuns were found by Capt. Baker to surpass every other tree in elasticity,—to break with 903 lbs. with specific gravity of 986. Capt. Hannay speaks in the highest terms of two species, but he describes the wood as very light, whereas from the specific gravity mentioned above, it is evidently a very heavy wood;—he says the wood has the quality of standing the weather well, and kept constantly in water, to harden and get black coloured. It appears to me admirably adapted for oars and ship's spars.

The above are, I believe, the most valuable timber trees in Bengal, and the number is indeed a large one, to which I could have added as many more nearly as good, plainly showing that there is no country in the world to surpass this in its timber produce. I regret much that my approaching departure for England renders it impossible for me to make this list as complete as I could have wished. The subject is a deeply interesting one, and having paid great attention to it in India, I hoped some little advantage may have been derived from my observations. There are several trees no doubt possessed of equally valuable properties, but they are only known by uncertain native names. I would respectfully suggest that Government be requested to direct their officers located in favourable positions to send in leaves, flowers and fruit of the trees reputed in their neighbourhood to be useful for timber. As it may be seen above that peculiar uses seem to run in the same natural family, a botanist could in every case indicate the probable value of the timber. I would



A observe that it is a well known fact, that wood grown in hilly countries is far superior to that grown in the deep soil of the plains. The trees are longer in coming to perfection, and mature their juices more slowly and solidly. This is particularly exemplified in the Sandal wood, which never is possessed in the plain of the good rich scent that it has when growing in the hills of Mysore, about 2000 feet above the sea. X The Cedar of Lebanon also, which I believe to be identical with *Cedrus deodar* of the Himalayas, is almost valueless as a timber tree, unless grown in rocky stony places, where there is but little soil. It is very remarkable to observe the difference of the quality of the Deodar wood which is grown on the south side of the snowy range from that produced in Kunawur on the precipitous sides of the Sutledge. Another remark I would particularly call attention to, is the felling of timber at the proper season when the sap is at rest. It requires no botanist to point out when this is to be done, as although the leaves do not fall off in India, as in more temperate climates, it is impossible to find any difficulty in deciding from the appearance of the tree, when the time for felling has arrived. When the sap is rising, the leaves are generally somewhat soft and perfect. When it is at rest, the leaves are harder, and in India almost always corroded by insects. In consequence of the facility of barking a tree when the sap is rising, oaks are often felled at this season in England, always with disadvantage to the timber, and this same facility of barking may also be an inducement to others in this country to fell timber at improper periods of the year. O

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*Report on a Passage made on the Nurbudda River, from the Falls of Dharee to Mundlaisir, by Lieut. KEATINGE, and of a similar passage from Mundlaisir to Baroach, by Lieut. EVANS. (Communicated by the Government of the N. W. Provinces.)*

No. 753 of 1847.

From J. THORNTON, Esquire, Secretary to Government N. W. P.,  
To the Secretary to the Asiatic Society, Calcutta, dated Head Quarters, the 4th October, 1847.

SIR,—I am directed by the Hon'ble the Lieutenant Governor N. W. Provinces, to forward to you for submission to the Asiatic Society, the

accompanying copy of a report by Lieut. Keatinge, of a passage made by him during the last rainy season on the Nurbudda river, from the falls of Dharee to Mundlaisir, and also copy of a report by Lieutenant Evans, of a similar passage at the same season, from Mundlaisir to Baroach.

2. The Lieutenant Governor considers that these papers might be advantageously printed in the Society's Journal in continuation of Mr. Shakespear's note on the Nurbudda river.

I have the honor to be, Sir,

Your obedient humble Servant,

*Head Quarters,*

*the 4th October, 1847.*

J. THORNTON,

*Secretary to Govt. N. W. P.*

Copy.

*From Lieut. R. H. KEATINGE, Asst. to the Poll. Agent, Nimar.*

*To Captain P. T. FRENCH, Poll. Asst. in Nimar, dated Mundlaisur,  
6th August, 1847.*

SIR,—I have the honor to inform you that according to your suggestions I left Mundlaisur on the 29th of July, and proceeded towards Dawree, to see if a road could be made along either bank of the Nurbudda, so as to circumvent the falls opposite that place.

2nd. Leaving Burwae, on the 30th of July, I proceeded to Seylanee, a distance of 14 miles, by the road lately cleared; about 6 miles from Burwae, the jungle becomes a forest, and continues so to Dawree, which is 18 miles from Seylanee.

3rd. During the whole of the day, as I rode through the forest, I was surprized to see large and old timber left uncut within a mile of the river, but on enquiry was informed that it was impossible to transport any but the smallest sized trees, even that short distance, owing to the absence of tolerably clear paths.

4th. Bamboos, however, are cut in great numbers, and brought to the falls, where the Gonds, who carry them there, exchange them for grain with speculators from Mundlaisur and Mehasur.

5th. On the upper or Eastern side of the falls of Dawree, the rock slopes into the river at an angle of from 1 to 2 degrees, and is so

smooth and level that in most places a cart could even now be driven over it; below the fall, however, the rock ends in abrupt and irregular steps of from 10 to 50 feet, and during the three days I spent at Dawree, I looked in vain for a place where a road could be made without considerable expense, to slope down to the water's edge.

6th. Within half a mile of the village there is a perpendicular rock 51 feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls is only a distance of 1490 yards, which could be made fit for carts at the cost of 4 or 500 Rs.

7th. Timber, both large and of a good description (ungun) grows on the spot, so that no difficulty exists to large and powerful (though doubtless rough) cranes and windlasses being constructed on the rock where they are to be used.

8th. Many of those who now go up the Nerbudda for the purpose of buying or cutting wood, leave their boats at Dawree, whilst others with great labour drag them (if light enough) over the rocks, but for this many men are required; all these are of the poorest of these poor provinces, and unaided will never be able to afford the expense of in any way surmounting the difficulties of the river at Dawree; but I feel convinced that were such a measure undertaken, we should see a trade spring up between this and the Hoosungabad Provinces.

9th. Several natives with whom I conversed had been up the river as far as Chund-ghur, the site of the great Iron mines, 12 coss above Dawree, and report the stream quite as clear as below.

10th. On the 3rd of August, at 12 o'clock, I left Dawree in a boat with six boatmen, about the same number of attendants, and a good load of baggage, and arrived at Oonkur, a distance of 20 miles, at 5 P. M., without meeting any obstacles or delay.

11th. On the 4th of August, I left Oonkur at 5 A. M. and arrived at Mundlaisur (30 miles) at 6 P. M., having stopped an hour on the way; our progress this day was much impeded by a smart westerly wind, but the river presented no sort of difficulty.

12th. During the rains of 1845 I went by the river from Mundlaisur to Oonkur and back, and in March, 1846, I proceeded from

Oonkur to Dawree and back again, the stream being at that time very low, but on neither occasion did I meet with any obstruction.

I have, &c.

(Signed) R. H. KEATINGE, *Lieut.*

*Assist. to the Poll. Agent in Nimar.*

P. S.—I have the honor to enclose a section of the proposed road along the northern bank of the river at the falls.

(True Copy.)

(Signed) W. F. EDEN,

*1st Asst. to the Resident.*

Copy.

*Report of Voyage down the Nurbudda from Mundlaisur to Baroach, in the month of July, 1847.*

I left Mundlaisur on the morning of the 22nd July, 1847. Having two boats, one the common ferry boat, flat-bottomed, wall-sided; about 30 feet long and  $2\frac{1}{2}$  high, requiring 4 men to manage, and capable of carrying 6 marries pucka; (2880 lbs.,) and the other consisting of 3 canoes, lashed together with a platform of bamboos upon them. This latter I took, having some doubt as to the possibility of getting a large boat down the Hirn Phal rapids, remembering what Captain Anderson had done (vide his report) and intending, in case of extreme difficulty, to unlash the canoes, and carry them round the rapids, launching them again below. The result, however, will show that the flat bottomed are the boats best of all calculated in all seasons for this navigation.

2nd. We reached Chiculda on the 24th, a distance, I suppose, of nearly 60 miles. The only obstruction, below Mundlaisur to this point, is the Suheshur Dharrah. This has been so well described by Captain Anderson, that I need not enlarge upon it. It can either be got over by a road along the southern bank, or by, as he proposes, deepening the backwater. Should the former, for reasons hereafter given, be preferred, the accompanying plan drawn by Lieutenant Keatinge, of the Bombay Artillery, Assistant at Mundlaisur, who has kindly levelled and surveyed this spot, will show the road proposed, a distance of about 1200 yards in all.

3rd. I left Chiculda on the 25th, and reached the Hirn Phal at 12 of noon. This distance, about 16 or 17 miles by the map, is perfectly



clear, and free of obstructions. Captain Anderson calls it 25 miles, but I think this is a misprint for 15. The river, when I reached the Hirn Phal, had risen about 18 feet above hot weather height.\* I had often before been at the place, and was therefore enabled to estimate the height with tolerable accuracy. Like Captain Anderson, I experienced very little difficulty in descending this rapid, for it is nothing more,—but it is the Boorkherry rapid, one mile below, that offers the chief obstruction. This Captain Anderson mistakes for the Hirn Phal, whereas the first place goes under that name. The Boorkherry rapid I succeeded in getting my boats down with some difficulty, by the southern channel, but a road, I am inclined to think, would be the best mode of overcoming this obstacle; as when the river is low the length of the rapid would increase the difficulty considerably. The immense height to which the river rises in the monsoon, sometimes 70 feet above hot weather height, would be a serious objection to a lock or locks; but on this point I am not competent to speak.

4th. About two miles lower down (or even less) is another place called the Gunnee Ghat, the features of which are precisely similar to the Boorkherry rapid. Here, however, the fall being inconsiderable, it would be necessary only to clear away the detached fragments of rocks in the bed of the channel, to render it perfectly passible. From hence to Beytala, 20 miles, a Bheelala village on the north bank, 4 miles below the Hutnee river, the river is clear and deep, and the voyage offered no difficulty.

5th. The hills on either side from Dhurmrai, above the Hirn Phal, to Beytala, rise to a good height, and are covered with jungle. Inhabitants are very scanty. Dhurmrai is inhabited by a few Bheels, under Kaloo Sing Bheelala. On the north bank, 10 miles lower down, is the large Bheel hamlet of Dussana, the people of which were formerly notorious for their predatory habits, but they are now peaceable enough; 6 or 7 miles beyond this, about one mile inland, from the mouth of the Hutnee, is Kukrana, a Bheelala village, in the Rajpooor district; and two miles lower down, on the south bank, is Bhudul, a

\* The boats were let down by ropes attached to the stern by a channel in the middle of the belt of rocks, the said channel being a rocky slope in which the water was some 2 feet deep. In the fair weather when the river is low, boats go by the backwater channel.

Bheel village, the residence formerly of the notorious freebooter Bamun Naik, now held by his son, a peaceable reformed character.

6th. To Kukrana, Captain Anderson penetrated, and it was the fear of Bamun Naik, then openly in arms, that caused his boatmen to refuse to advance.

7th. At Beytala is an obstruction very much resembling the Suheshur Dharrah. It is a belt of rocks stretching diagonally across the river. From the middle to the north bank, the rocks are perpendicular, except in one narrow channel near the bank, but towards the south bank, they are worn away, and I found little difficulty in letting my boats down, guiding them by ropes attached to the stern. There may however be more trouble in doing so in the dry season ;—when I passed, the river was fully 20 feet above hot weather mark.

8th. Below this again is a very bad rapid, about  $\frac{1}{2}$  mile from Beytala. I tracked my boats down near the northern bank, but am inclined to think that there is deeper water in the middle of the river, merely obstructed by some large rocks, which just showed their heads above water, at the bottom of the rapid, and caused such a sheet of broken water, that I dared not trust my boats within it.

9th. From about 5 miles below this, the hills rise to a much greater height, the scenery is magnificent, and the river deep, very rapid, and free from material obstructions. Both banks are studded with Bheelala villages, but the jungle is very dense around their little patches of cultivation. The rocks, forming the banks, are high, in many parts almost perpendicular ; the stream has a current of about 6 miles an hour. From Bhadul the southern bank is Akranee, a portion of Khandeish, and the northern from the Hutnee is Mutwar, a Bheelala Thakoorship.

10th. To Haump, 25 miles, the features of the river are the same, lofty hills, scarped rocky banks, deep channel, here and there rapids of no consequence, and a strong current. Haump belongs to the Rajá of Oodeypore, a feudatory, I believe, of the Guicowar, and is merely a temple, there being no village ; here the river narrows still more, and about 2 miles below commences a series of rapids, known as the “Balu Gori,” of the difficulties of which I heard much. It continues about 4 miles ; the river much confined rushes rapidly between high rocks ; and with ordinary care in a large boat there is no danger.

But with the raft, the waves washing in filled the canoes, and swamped them, and we had to swim for it. Whereas the flat bottomed boat passed without trouble; nevertheless, it is a place that would always require care, yet, as it become known, I have little doubt it would be scarcely thought of.

11th. As far as Soolpan, 27 miles from Haump, the river is, as I have described it. About 6 miles below Soolpan are the Mookree falls. These being always mentioned as nearly, if not totally insurmountable, I examined carefully. The river at its ordinary rainy height, about 25 feet above hot weather mark, covers the rapids entirely, and we shot past them with little trouble. But when the river is low, there is a fall of 8 or 10 feet. Now all the people spoke of the existence of a backwater, by which, as at the Suheshur Dharrah, I can conceive no obstacle to boats passing either up or down. Moreover, from my own inquiries, and as mentioned by Lieut. Elwan, of the Hon. Company's Marine (vide his report) it seems that small boats do actually now ascend, and carry Kupra-kerana, and salt to Haump, whence they return with timber. Lieut. Elwan says that toonies drawing 3 feet water go up, but my informants only spoke of canoes, which draw when loaded 6 inches. However, all whom I conversed with agreed that nothing exists to prevent large boats from going up. With Mokree end the hills and therefore the difficulties, from thence to Telluckwara, about 20 miles, is plain sailing, and below that boats of large size come up constantly.

12th. On carefully considering the character of the river, I may, I think, venture an opinion that it would take very little to render it navigable, in the following manner; although I should like to see it as well in the fair season, when it is low, so as to leave no room for doubt, as during my voyage it was swollen.

13th. At the Suheshur Dharra, the Hirn Phal, and Mokree, perhaps also at the Beytala Ghat, a road along the bank might be formed, for which the nature of the bank offers great facilities. There would be objections to the plan chiefly on account of the trouble and delay of unloading and reloading above and below; but when the difference of expense between a road and locks is considered, I think the former will be considered preferable. Moreover, by it the boatmen on the river would only have to work in their respective districts. The Bur-



wae, Mundlaisur, and Mhyshwur men would work between the Suhe-shur Dharra and the Dharree falls (above Oonkar, Maundata) the Ack-burpore, Durrampore, and Chukuldah men would carry on to the Hirn Phal. From thence another stage (or two) would bring to Mokree, below which the Tilluckwara boatmen come into play. At present there are no regular boatmen between Hirn Phal and Mokree (about 80 miles), the canoes that come up to Haump, being brought by fishermen and others incompetent to manage a larger boat.

14th. The Map, accompanying Mr. Shakespear's resumé of reports upon the river, is, generally speaking, very accurate. There are a few inaccuracies between Hirn Phal and Haump, but of no consequence. I regret that when my canoes were swamped at the Balagori rapids, my papers containing the bearings of the river in that part, were washed away.

15th. I may add that the difficulties to be surmounted seem to me to have been very much exaggerated. Such was also the opinion of my friend and brother-officer Captain Anderson, and I feel great pleasure in having followed where he had led the way. He was the first to descend the Hirn Phal; it was when the river was low, in March, and he felt confident, as do I, that the obstructions below the Hutnee river beyond which his boatmen's fears prevented his proceeding, were no more insurmountable, even at that season, than those above the Hirn Phal, for instance, which until his time was considered perfectly impassable for even empty boats.

16th. I have navigated the river above Mundlaisur for 60 miles, to the Darree falls, to which place it is perfectly passable, and boats constantly go up. At Darree, a road would also be required—above Darree, the falls of Mundhur are spoken of as bad, but the report is by a native, and I have no doubt it is by no means worse than those below. Indeed, the present Colonel Ousely, when formerly at Hoosungabad, states that from his inquiries he is convinced that Mundhur can be cleared. We should then have communication from Hoosungabad, near which the coal is found, to the sea. Coal, grain, linseed, and many other articles of the produce of central India, amongst which, not the least considerable, would be opium, would pass down; and from October, goods, cloth, spices, cocoanuts and Europe articles, supplies, could come up. The places where roads would be required would be trifling, and in the



rains, the time when coal could be sent down, even that would be diminished.

1st Stage—Hoosungabad to Dharree, about 100 miles.

2nd. Do. Dharree to Suheshur-Dharra, 70 miles.

3rd. Do. Suheshur-Dharra to Hirn Phal, 67 miles.

4th. Hirn Phal to Beytala Ghat, 20 miles. I am by no means certain that a road would be requisite at Beytalla.

5th. Do. Beytala Ghat to Mookree, 60 miles.

6th. Do. Mookree to Baroach, about 80 miles.

17th. I arrived at Baroach on the 1st August, having accomplished the whole distance from Mundlaisur in 11 days, during which I was  $102\frac{1}{2}$  hours actually under way. The distance between Dhurmrai, above Hirn Phal, and Mookree, about 80 miles, occupied  $21\frac{1}{2}$  hours only, although spread over nearly 5 days.

18th. The various reports referred to in this memorandum, Colonel Ousely's, Captain Anderson's, and Lieutenant Elwan's, I have quoted from a resumé made by Mr. A. Shakespear, Assistant Secretary to Government, North Western Provinces, entitled "Notes on the Navigation of the Nerbudda," and which with the map accompanying, require to be referred to, to render this intelligible.

I have, &c.

(Signed) H. L. EVANS,  
*Deputy Bheel Agent.*

True Copy,

(Signed) W. F. EDEN,

*1st Asst. Resident.*

True Copies,

H. TUCKER,

*Offg. Asst. Secy. to Govt. N. W. P.*

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*On the Cat-toed Subplantigrades of the sub-Himalayas.**By B. H. HODGSON, Esq.*

Amongst the very numerous mammals of these regions (135 species) the most interesting and least understood group is that I have denominated after Colonel Smith, the Cat-toed Subplantigrades, and to those who are still disposed to assert that the filum areadneum of natural classification can be traced by poring, how sedulously soever, over dry skins and drier bones, I recommend half an hour's consideration of the present group. All is chaos in recent systems with regard to the relations and position of these animals, which are represented in the sub-Himalayas by the Wáhs or Pandas, and by the Screwtails, and constitute respectively the genera *Ailurus* and *Paradoxurus* of Cuvier, to which Colonel Smith adds *Galidictis* (*Galictis* of Geoff.) I cannot pretend to remove this cimmerian darkness because it results from want of adequate information relative to the general structure, habits and economy, not merely of the species composing these two (or three) genera, but also of those constituting nearly all of the proximate forms. At least I do not find any adequate account of the majority of them, and I do find the greatest differences of opinion as to their true characters and relations prevailing among our most recent guides in zoology, such as Colonel Smith,* Mr. Gray,† and Mr. Waterhouse,‡ of whom the first upholds and attempts to carry out Cuvier's locomotive principle of subdivision, whilst the two latter entirely reject it. Cuvier knew little of the Wáhs or of the Screwtails. He defined or rather indicated the Genera late in his career from imperfect specimens transmitted immediately after their arrival in the East by Vaucel and Diard, gentlemen whom the Jardin des Plantes sent out to glean that harvest which English perverseness could not or would not take any sensible or intelligible steps to glean.§ I myself assisted Du Vaucel's researches

* Nat. Library, XIII. 155—174 and 190—224.

† Zool. Journal, Oct. 1836 and Catal. Brit. Mus. 1843.

‡ Zool. Journal, August 1839.

§ These steps can be but two, 1st sending out travelling naturalists, 2nd and far better, establishing concert with local residents : and that the Zoological Society with a revenue of 12,000£ per annum has yet taken neither, is a strong proof of radical defect in the proceedings of that Society.

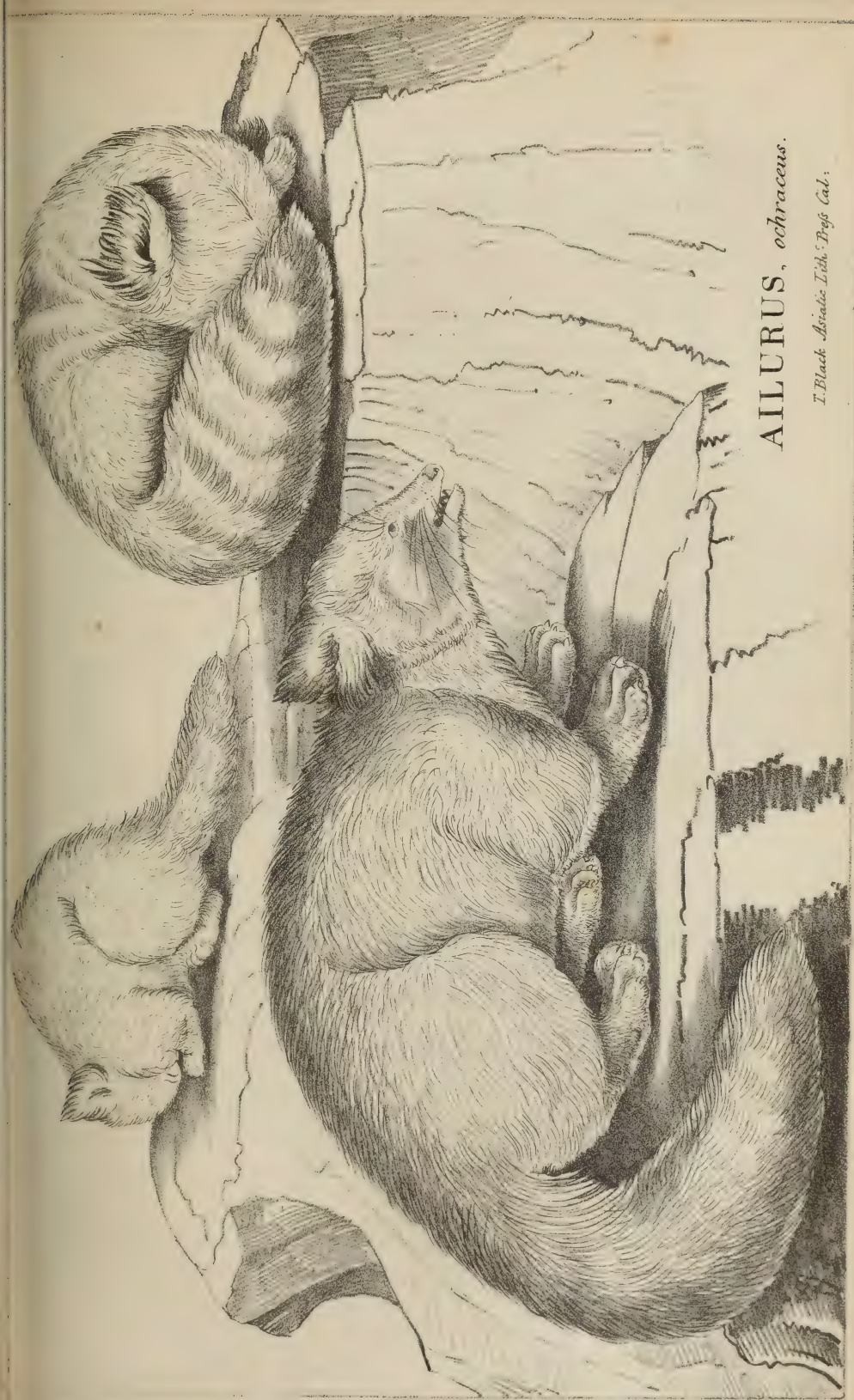
with alacrity. But at the same time I stated to the leaders of this science in England what a pity it was that want of ordinary measures on their part to secure the co-operation of their countrymen in the East should thus continue to prevent England's reaping the zoological harvest of her own domains; and I pointed to my own drawings, specimens and description of the structure and habits of *Ailurus* lying unused in their hands whilst their Journal was putting forth the mere crumbs gathered from Cuvier's* table, and whilst his active son-in-law was then preparing under my very eye and with my own aid to complete the supercession of what ought to have been from the first, and might even yet be in part, English researches. How and why my appeal failed I know not. They order these things better in France: and but for the untimely death of Du Vaucel and Diard, not merely the group of the Cat-toed Plantigrades, but every other group of Indian zoology, would have carried the permanent traces of English want, and French possession, of tact! I know not whether this reverence to the past may help to lead to that future concert and co-operation on our own part between the closet and the field, the men of home resources and the men of local opportunities, from which English zoology might yet derive such enormous advantages. But at least it will be allowed that the subject of my present paper has almost irresistably prompted this allusion to the past; for, on recurring to this group of animals after a lapse of 12 to 15 years, I find, not only the ample materials placed by me in 1833 within reach of my learned countrymen for the illustration of one genus (*Ailurus*) unused, (save for the completion of the dental formula,) at the sametime that the crudest statements relative to it continue to this hour to be put forth ex cathedra, but also the ample materials for the illustration of the other genus (*Paradoxurus*) which were not only collected but used and applied by Dr. Campbell and myself in 1835, as completely neglected, English writers on Indian zoology seeming to opine that it is a work of supererogation to consult the Transactions or Journal of the great *local* organ and channel of scientific research!† I do not now possess materials for the elucidation of these

* Zool. Journal, Vol. II. 419. Vol. III. 275.

† As. Trans. Vol. XIX. pp. 72—86, where the structure and habits of 3 species are described very fully: And yet Mr. Gray in 1846 (Catalogue, pp. 9, 10) quotes these as undescribed. Nor is there any sign that Mr. Waterhouse or Col. Smith had ever

AILURUS, ochraceus.

T. Black Asiatic Likh. Pegg Cal.



genera so complete in some respects as I formerly had. On the other hand I have added some fresh items to my former knowledge of the animals, and I can still refer to much that is valuable relative to those pristine investigations; and as the Wáhs or Pandas are animals as rare as they are understood, whilst the Screwtails, if commoner and better known, are still an enigma in many essential respects, I purpose to put together such an account of the organization and habits of both genera as my present appliances and means will permit.

In 1833 I transmitted to the Zoological Society a full and careful description of the habits and of the hard and soft anatomy of *Ailurus*, in the composition of which I was assisted by Dr. Campbell, and which latter included a comparison with the anatomy of *Ursus* on the one hand and *Ursitaxus* on the other. What became of that paper I know not, and have now to regret that the original MS. was lost with many others of great value at the period of my hurried departure for Europe. But the memoranda I still possess contain many valuable particulars, which I now proceed to summarise.

Order CARNASSIERS.

Family CARNIVORA.

Tribe PLANTIGRADES.

Genus *AILURUS*, Cuvier.

Range. The *Ailuri* appear to be confined exclusively to the sub-Himalayas, no species having yet been discovered elsewhere. In these regions their habitat is limited to tracts between 7 or 8, and 12 or 13,000 feet of elevation, so that they tenant the Northern confines of the central region of the mountains and all the juxta nivean or Cachar region as far as the forests extend, far beyond the limits of arboreal vegetation; they do not dwell in the direction of the snows.

Manners. These quiet inoffensive animals in their manners and diet much resemble the Badgers of our land, the Lemurs of Madagascar, and the Racoons, Coatis and Potos of America, the last most nearly; but as few persons are familiar with these animals, I shall, to avoid the illustration of *ignotum per ignotius*, proceed to mark the differences from the first named animals, to wit, that the Badgers are sub-omnivo-

referred to the Transactions. Let me add that in these allusions to the past I utterly disclaim complaint on my own part, but think that for those whom it concerneth advertence to the past may help the future.

rous diggers, dwelling in cavities of their own formation, whereas the wáhs are vegetalivorous climbers, frequenting trees much, but breeding and feeding chiefly on the ground, and having their retreat in the natural resiliencies of rocks. They are monogamous, and live in pairs or small families, consisting of the parents and offspring, who all remain together till the next brood is about to appear, when the mother drives the grown young off. How long the female gestates I cannot learn, but she brings forth amid the recesses of the rocks in spring or early summer, almost always two at a birth, one of which is frequently much larger than the other, though the sexes at maturity hardly differ in size and not at all in aspect, nor the young from the parents in the latter respect. The Ailuri feed on fruits, tuberous roots, thick sprouts such as those of the Chinese bamboo,* acorns, beech mast and eggs. The last they are very fond of, and eating them is the nearest approach they make to animal food, unless we must also add to the list of their eatables the young of birds and of small mammals—which I doubt, though I am assured of the fact. In general the wáhs eschew flesh, fish, insects, reptiles, absolutely. But they love milk and ghee, and constantly make their way furtively into remote dairies and cowherds' cottages to possess themselves of those luxuries. Their ordinary feeding times are early morn and eve. They sleep a deal in the day and dislike strong lights, though not nocturnal in their habits of seeking food. Their manners are staid and tranquil: their movements slow and deliberate: their tempers placid and docile, so that they are easily tamed and may be suffered to go abroad soon after they are taken, even though mature, and still more if young. They are delicate animals and cannot endure heat at all, nor cold well, amply and entirely as they are clad in fur. They are not pugnacious nor noisy, but remarkably the contrary of both. As climbers no quadrupeds can surpass, and very few equal them, but on the ground they move awkwardly as well as slowly, yet without any special embarrassment. Their slow action is a perfectly plantigrade walk; their quick, a series of bounds with the wrists touching the ground, but not the tarse, nor of course the heel, and the back always, though more especially in quick movements, much arched, but the tail little raised even under excitement. Saving the last particular, such in action is the Marten of these Hills (*Flavigula*) and the

* Hence one of their names, viz. *Nigálya-pónya*.

Urva and Helictis, and, in a less degree the Badger, but not the Bear-Badger (*Ursitax*) nor the Bear, whose backs are uncurved, and their bounds more directly forward, and less digital quoad the hind feet, when in quick movement. In its power and mode of climbing the Wah most resembles the *Paradoxuri*, but also much the *Martens*, and far surpasses the Bears which can climb only in youth, and in descending are obliged to let themselves slip or slide down, tail foremost, whereas the Wahs, like the *Potos*, throughout their lives climb steadily and firmly, upwards and downwards, without any necessity for "turning their backs on themselves," or any dependance on slope or on spring, their high scansorial faculty being the joint result of their ursine powerful and highly articulated limbs and of their sharp feline talons, as in the case of the *Paradoxuri*, animals which the *Ailuri* intirely resemble in the substance, and I think* also in the details, of these most singular structural combinations, combinations to which we must also refer the mode of fighting peculiar to both genera, viz. by grappling and scratching with all four extremities at once. Neither the *Paradoxures* nor the *Ailures* are wont to use the erect attitude of the Bears on these occasions. On the contrary, they roll on the ground, whilst hugging and tearing each other: nor did I ever observe either employ the hands as the *Racoons* and *Coatis* and Bears do to facilitate the process of eating. The Wahs, as I have observed above, sleep much by day, though not strictly noctivagrant, and they repose frequently in an upright attitude resting on the large broad palma and planta with the head tucked between the fore-legs and under the chest, like *Racoons*† and *Lemurs*,‡ but more generally, like Dogs or Cats, that is, laid on the side and rolled into a ball, the head being concealed by the bushy tail which is carefully drawn round so as to cover the eyes and exclude the light. The Wahs have little of that eminent development of the senses which distinguishes most animals as opposed to man: their touch, sight, and hearing are dull; their smell not very acute, though the quickest sense they have; and hence they are easily taken, having moreover little speed, cunning, or ferocity to protect them.

* I speak doubtfully, because I have not the entire skeleton of *Ailurus* now to refer to, nor copy of the paper above alluded to as sent to the Zool. Society in 1833, in which the hard anatomy was throughout detailed from several perfect specimens.

† *Regne Animal*, II. p. 249.

‡ *Idem*. I. p. 325.

I have had many brought to me and have kept several for a year or two in Nepal, feeding them on rice and milk or milk only, or eggs, all of which they like, but wholly refuse rats, fish, insects, snakes, and rarely and reluctantly taking flesh of any kind. I have often put a small live fowl into their cage, but seldom knew them kill and never eat it, though if it approached them too nearly they would rush at it and give it a severe and possibly fatal blow with the fore paws. The amenity of their ordinary disposition is finely portrayed in their gentle countenances, and, as they are free from all offensive odour, they would make nice pets for ladies, particularly when young. They drink by lapping with the tongue and moderately. They hiss and spit like cats when angered, and, if extremely so, utter a short deep grunt like that of a young Bear; but ordinarily they are quite silent. The flesh is never eaten: but from the prepared pelage caps are made, and that is the limit of their œconomic value.

Names and species.—To the Tibetans, Nepaulese, and Sikimites the Ailuri are known by the names Wáh, Oá, Uktónka, Saknam, Thóngwáh and Thó-kyé. Also, Yé and Nigálya pónya. I never heard the name “Panda,” nor did I ever see a specimen answering to the description, in point of colour, of the Panda.* Wherefore I think it probable that the Nipaulese and Sikim species may be different from the Panda, and that the latter is a species peculiar to Bhútán. Under this impression and in order to complete my account of the former, I shall add the description of its colour and subjoin a fresh trivial name. Panda or Fulvens of Cuvier is as yet the only recorded species.

General form and aspect.—Ailurus Ochraceus, Nepalese Ailurus. Above deep Ochreous red; below and the ears, entire limbs, and tip of tail jet black.† Head and tail paler than the body and fulvous: this paler hue displayed in frequent rings upon the tail, and in a vague diluting merely of the red tinge upon the head. Face, chin and lining

* Nat. Library, XIII. 217, and Pl. 17: Zool. Journal, ut supra.

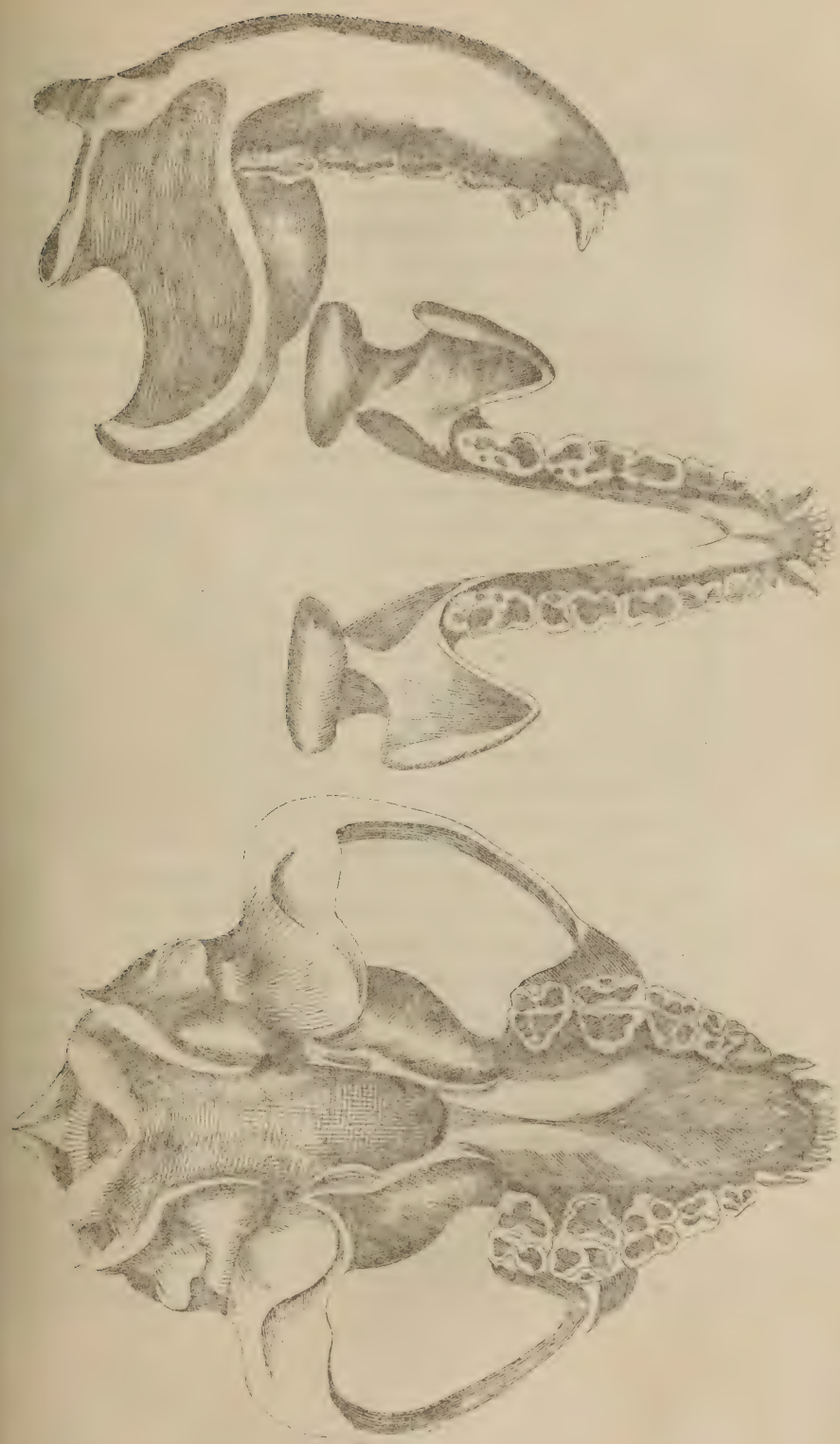
† Thus the Wáh is one of the infra nigrescent group, a group comprising Ursitax, Urva, Mellivora, Galictis (Bell), Meles, Taxidea, Eira, Arctonyx, Ailurus, and consequently this peculiarity would seem to be but a doubtful index of essential conformities, though perhaps we may thus be guided to the clue of that singular interlacing whereby the Ursine-taloned or digging, and the Feline-taloned or scratching Subplantigrades so remarkably cross and recross each other, as though it were possible to reconcile a Pango-line with a Tigrine nail !!

of ears, white. From eyes to gape a broad vertical line of ochreous red, blending with the dark inferior surface. Hairy pads albescent. Moustaches white Eyes deep brown. Nude muzzle black. Snout to vent 22 inches. Head $5\frac{1}{4}$. Tail 16. Height 9 to $9\frac{1}{2}$. Weight 7 to 8 lbs. Pelage very thick, loosely applied to the skin, of two sorts; the outer hair, rather harsh than fine, straight, of moderate equal length ($1\frac{1}{2}$ inch) and covering every part of the animal save the extremity of its nose; the inner vest, shorter, sparer and woolly. Internally the pelage is dusky; externally, deep ochreous; and on the back the hairs are more or less tipped with fulvous, especially in old age. In their general appearance the Wahs are quite unique. They might be described like the Racoons as small Bears with long tails, did not their short sharp visage and eminently bland expression of countenance sunder them intirely from Ursine semblances, and approximate them to the Lemurs, particularly those typed by Galago Macaco: but to be apprehended they must be seen.* They have a short sharp conic face ending in a neat round muffle in which the dog-like nostrils are pierced antero laterally; a small unprominent eye situated nearer to the nose than to the ear, and having a round nearly unchangeable pupil; rather small moustaches and minor tufts over the eyes, behind the gape, on the cheeks and on the chin; a broad rounded head; moderate sized, highly but remotely placed ears of a narrow conoid form tending to a point and almost hid by their ample confluent lining and tufts; helix void of fissure; simple conch; small basal tragus and antitragus; a longish yet thick neck and body; short strong plantigrade limbs ending in large very mobile pentadactylous feet, armed with feline talons and enveloped in woolly socks with Leporine completeness; and, lastly, a long thick cylindrico-tapering tail which is trailed like a fox's brush and neither convolved with the Paradoxuri, nor prehensile with the Arctictes and Potos, close as undoubtedly is the relationship of these genera, and especially the last named, to Ailurus.

Osteology—Skull.—The skull of Ailurus possesses characters quite unique; its extreme sphericity, its great height, the surprising curvature not only of the superior but of the inferior outline also, the ex-

* See the accompanying admirable sketches showing the animal in all its ordinary attitudes, and done from life.

treme bend of the rami of the lower jaw, the enormous size of the postea and vertical portion of the lower jaw, the elevate position of its condyles, the small size and inward inclination of the occipital plane, the high position of the occiput with respect to the whole skull, lower jaw *included*, its low position with respect to the encephalon, or generally to the whole skull *without* the lower jaw, the great size of the alæ or crura of the occiput, the extreme smallness of the auricular tympana and generally of the organs of sense, the very deep cylindric hinging of the jaws, yet so as to admit much lateral motion, the breadth of the upper jaw and teeth, the narrowness of the lower jaw and teeth, and the consequent high lateral action whereby alone their crowns can grind on each other, the perfectly triturant character of the molars, consisting not only in their breadth and flatness of crown, but in the admission into their composition of the soft dark substance of ruminant teeth—all these are characters of the skull which in their combination it would be in vain to look for in any other genus of the Carnivora, and many of which seem to approximate the Ailuri rather to the Ruminant than Ferine model. To the cat's skull there is not more resemblance than to the Bear's, for in Ailurus as compared with Felis the culmenal line is as much more bent down a parte post, as it is less so a parte ante; and short and inclined as is the face in Ailurus, it is as much longer and straighter than that of Felis as it is shorter and less straight than that of Ursus. The general style and proportion of the nasals, frontals and parietals of Ailurus are much nearer to those of the same bones in the Screwtails, the Martens, the Badgers, the Bear-Badgers, the Helictes and the Urvas, than in the Cats or Bears; and in the form and size of the orbits and of the frontals there is an extreme similitude amounting almost to identity with the former—an utter contrast with the cats, with Ursus less contrariety. In Ailurus the nasals are short and a little retroussé; the frontals moderately broad and arched lengthwise and across; the temporal depressions moderate but distinct; the orbits small and very incomplete; the zygomæ very ample and terminating posteally and inferiorly in large semi-cylindric processes that serve to hinge the jaws so completely as to render separation of them even more difficult than in Meles or Taxidea; the parietes ample in length, breadth and swell, though the cristæ, as well as the temporal fosses, be decided—as much so as in the Badgers and Screwtails, more so than



in the Martens or Cats, in which the fosses are evanescent ;* the auditory cavities very small ; the olfactory cavities moderate ; the frontal sinuses large ; the palatal bones curved convexly, and the rami of the lower jaw as much concavely ; the coronoid processes of the latter enormous and inclined forwards ; the bones of the skull in general thick and massive ; proportion of the face to the rest of the skull, as one-third.

Teeth.—The dental formula is $\frac{6}{6} \cdot \frac{1}{1} \cdot \frac{5}{5} : \frac{5}{5}$; but the first pair of the lower jaw are deciduous, and, in old animals especially, the molars are (I write with fine samples before me) more frequently $\frac{5}{5} : \frac{5}{5}$. The incisors are close together and ranged nearly in a straight line to the front, those of the lower jaw touching the canines, whilst those of the upper jaw are separated therefrom by the usual interval for the passage of the lower canines. The exterior incisors of the upper jaw are larger than the rest, and are as much scarped externally as are the lower canines internally, by reason of that friction of the one against the other which is caused by the high lateral action of the jaws. Canines small, conic, little curved, faintly grooved lengthwise, the upper insulated, the lower in contact with the incisors and molars. Molars divided by their characters into false and true, without any possible distinction of carnassial and tubercular teeth. Premolars $\frac{2}{3} : \frac{2}{3}$, including the deciduous ones : last pair rather triturant than trenchant. True molars $\frac{3}{3} : \frac{3}{3}$. Upper true molars disposed transversely, squarish in form, nearly equal in size and exhibiting on their, in general, flat crowns, 3 or 4 sunken central spaces filled with the dark soft substance above alluded to, and which is bounded serpentinely by rounded rather than dentated margins of enamel and a central transverse sinuous ridge of the same. True molars of the lower jaw disposed lengthwise, narrow, parallelogramic or elliptic ; the first pair smaller than the two others, which are equal ; and all exhibiting central masses of crista petrosa enveloped by a serpentine sinuous margin of enamel, as in the upper jaw nearly. In the composition, forms and action of these teeth taken together, there is little or no real resemblance to be found with the teeth of even the least carnivorous of the ordinary carnivora, such as the Bears, Badgers, and Screwtails, though it is among them that one

* In the Viverrines, the fosses and the crests are both of extreme size, and the brain-pan consequently much reduced. In these respects there is no resemblance with the Ailures ; nor in other respects.

naturally looks for the dental prototype of *Ailurus*. But I apprehend that several of the genera to be presently enumerated as the probable components of the group of Cat-toed Plantigrades, will be hereafter found to exhibit a closer resemblance and more harmonious blending with the Ailurine type of dentition as of general structure.

Bony carcase.—I have not now a perfect skeleton of *Ailurus* to refer to; so far as I can trust my notes, the bones are as follows:—Cervical 7. Dorsal 13. Lumbar 5. Sacral 3. Caudal 22. Carpal 8. Metacarpal 5. Digital 3, for each toe fore and aft. Tarsal 9. Metatarsal 5. Ribs 13 pairs, whereof 5 pairs are false, and 11 true. The short strong and highly articulated limbs, together with the finely harmonising flexile wrists and ankles, bear an extreme resemblance to the extremities of the Martens (*Flavigula**) and Screwtails, and have much similitude with those of the Bears (*Helarctos*) but form a complete contrast with the extremities of the Cats and of the Civets. On the other hand, the highly mobile digits, disencumbered of the palmary and plantary mass, are much more similar to those of the Cats than to those of the Bears, and bear a resemblance amounting almost to identity to the digits of the Screwtails and Martens. The 5th or internal digit is very little withdrawn from the front, and is forthcoming alike in the anteal and postal extremities. Of the other 4 digits the 2 central are nearly equal and the 2 lateral also, but with an andromorphous bias, and the whole are united as far forward as the terminodigital pads by a highly elastic membrane, which allows the freest play to the digits.† The thick socks however in which the feet of the Ailuri are completely enveloped, must impede their power of feeling and even of raptorial grasping, as compared with the paws of the Martens and Paradoxures, though the extreme mobility of the unguical phalanges still leaves the sharp and compressed talons almost as serviceable as in either of those genera. The talons of the Wáhs are as highly curved, as much compressed, and as sharp, as in the Screwtails or in the Martens, and I might add, in the Cats, for there is hardly any appreciable difference between the four genera in those respects, and

* In this animal the dorsal vertebræ (and ribs) are 14: the lumbar 7: the sacral 4: the caudal 26: the rest as in *Ailurus* ut supra. The teeth of *Flavigula* (molars) are $\frac{2}{2}$. It is therefore a *Martes*, not a *Mustela*.

† See accompanying sketches.

the talons of all are equally reversile over the penultimate phalanges, and equally retained there, except when required, by the strong tensor tendons, the difference of the digits consisting in this only, that those of the Martens are not at all sheathed, those of the Paradoxures and Wáhs are but half sheathed, or little more than half, and those of the Cats, completely so. This is a difference which but for the terrific energy of the Feline paw one should be disposed to underrate, and I confess that after the most careful examination of the organs I am inclined to attribute the superior force of the Feline arm's stroke to the momentum and velocity inseparable from the digitigrade structure rather than to any difference in the organization of the digits and talons, points in which it appears to me that the Ailuri, Paradoxuri and Martens* are all upon a par with the Cats, or nearly so. I am aware that this is a statement at variance with the law of correlation and dependance of parts in structure. 'Show me,' exclaims our great master Cuvier, with the noble confidence of genius, 'show me a nail and I will show you the whole structure of the animal which bore it.' And I shall be probably told with a sneer that the Cats and Weasels are the most exclusive of blood spillers, whilst the Paradoxures are mainly, and the Ailures (according to my own account) exclusively, vegetalivorous. I can only say in reply that I endeavour faithfully to report what I have carefully examined; that he who affixed the Feline paw to the Ursine arm of Ailurus apparently delights to accomplish the same ends by very varied means; that there are many things in his *systema naturæ* which our's yet halts behind the comprehension of;† and that, for example, in our systems the contrast is much greater between the structures, than it is between the habits, of *Ursus ferox* and of *Felis tigris*, or of the Racoons and Coatis on one hand, and the

* I mention the Martens more frequently than the Weasels proper, because I have before me fine fresh specimens of the former; but in fact the latter agree with the former in regard to the feet.

† The systems which associate Ailurus and Arctictis with the Bears, and dissociate Ursitaxus and Mellivora from the Bears, and range Lutra with the Seals, and Paradoxurus with the dog-like Viverræ, are surely not quite in harmony with the method of the divine designer. The Palmate foot of Lutra may be seen in Martes, Paradoxurus, &c. and the free lateral and postcal action of the hind legs of Lutra, in those genera, as well as in the Coatis, the Potos, the Wáhs, &c. So that there is no need on *these* accounts to sever Lutra from his old allies.

Wahs and Benturongs on the other. I pretend not to account for, I only report, the frugivorous habits, gentle disposition, ursine arm, feline paw, profoundly cross-hinged yet grinding jaws, and purely trituran and almost ruminant molars, of *Ailurus*; and to these I now proceed to add, however they may square or not with systems which Cuvier himself was forward to deprecate the premature march of, the details of the soft anatomy of *Ailurus*, merely adding-in this place with reference to the socks of *Ailurus*, that we have examples of this peculiarity not only among the plantigrade Bears (*Ursus Maritimus*) but also among the digitigrade and purely carnivorous Weasels (*Lutra latrix*.)

Soft anatomy.—The anus, peroneum, and prepuce, are entirely free from glands and pores. There is no trace of the Cacodean anal glands and pores of the Mustelidæ, or of the Euodean preputial ones of the Viverridæ, so that in this remarkable respect *Ailurus* is affined to the Feline or Ursine, and sundered alike from the Musteline and from the Viverrine groups. Anus large, nude, void of all trace of gland or pore. All the proximate parts covered with hair. Perineum simple. Scrotum wanting. Testes long, narrow, concealed in the groin. Penis directed forwards, dog-like, and furnished with a small simple bone. Vulva simple. Uterus bicornute with large horns. Teats eight, and ventral, or rather disposed in fours, whereof the upper 4 are sub-pectoral, and the lower 4, sub-inguinal. Intestinal canal five lengths of the animal, nine feet long, of great equal diameter, void of cæcum and about one inch in width. Stomach large, simple, membranous, thick coated and glandular towards the lower orifice, hemispheroidal, with terminal orifices, of which the lower one for about 3 inches presents the character of a subsidiary stomach or glandulous neck to the ordinary stomach. Great diameter of the stomach 11 to 12 inches. Small, $4\frac{1}{2}$ to $5\frac{1}{4}$ inches, exclusive of the glandulous neck. Spleen tongue-shaped, purple red, $5\frac{1}{4}$ inches by $1\frac{1}{4}$. Lungs 6 lobed. Liver 6 lobed and a lobulus. Gall bladder very large, ovoid, occupying the whole centre of the largest lobe of the liver and passing through from side to side of it. Tongue smooth, simple, not unusually extensile. Pupil of the eye round ordinarily, and but slightly. Third eyelid capable of being brought over the whole organ nearly.

The above details of the soft anatomy, like those of the hard, offer

nothing very decisive as to the affinities of *Ailurus* with reference to the grand divisional types. Looking to the chylopoetic viscera, for example, the proportionate length of the intestinal canal is much nearer to that of the Cats than to that of the Bears, whilst the absence of cæcum is more Ursine than Feline. In the Bears (*Helarctos*),* the intestines are 12 or 13 lengths of the animal; in the Cats but 3 to 4; in the Weasels, *Viverrines* and *Paradoxures*, 4 to 6; the greater lengths belonging to the latter two, which nearly agree in this respect with the *Wahs*, but differ from them by the presence of the cæcum, which again the Weasels with but 4 lengths of intestine want, like the *Ailuri* with 5 lengths. Upon the whole, though the foregone details of the structure and of the habits of *Ailurus* cannot fail to be highly interesting to all real students of Zoology, yet the structural particulars want completeness fully to meet a case of so much difficulty, although if a similar amount of information were forthcoming relative to all the several animals composing that group, with which I suppose *Ailurus* to be more immediately connected, the question of proximate affinities at least would be placed in a tolerably clear light. The genera to which I allude are *Hemigalea*, *Nandinia*, *Amblidon* vel *Paguma*, *Cynogale*, *Cryptoprocta*, with a *Viverrine* dental formula—and *Galidia*, *Galidictis*, (*Galictis* of Geoff.), *Bassaris*, *Arctictis** and *Cercoleptes*, whose dental formula appears to be, at least as to number and general character of teeth, identical with that of *Ailurus*, due allowance being made for the disturbing influence of deciduousness in the pre-molars.

The fortunate circumstance of our being enabled in regard to the last named genus, or *Cercoleptes*, to refer to the investigations of a Cuvier,† an Owen,‡ and a Humboldt,§ exercised upon living and perfect samples (not mere skins or bones) corroborates as far as it goes, the correctness of the above conjectures, which are further confirmed by Mr. Cantor's scanner but valuable notices|| of *Arctictis*.

* There are some valuable particulars relative to *Arctictis* by Mr. Cantor in No. 171 of the Journal. The preputial gland and linear vertical pupil of the eye, and presence of a cæcum are notable coincidences with *Paradoxurus* and deviations from *Ailurus*.

† F. Cuvier apud Menagerie Royale, quoted by Griffith, Regne II. 266—9.

‡ Zool. Jourl. Aug. 25, 1835.

§ Travels as quoted by Griffith. loc. cit.

|| Asiatic Journal, Bengal, No. 171, pp. 192—4.

It is thus demonstrated that the Potos of the new world represent with considerable accuracy the Pandas or Wáhs of the old world ; that the two have much conformity of structure and of habits ; and that both exhibit that leaning towards the Lemurs whereby the perfectly vegetalivorous diet, quasi ruminant teeth and skull, extreme gentleness of aspect and of nature, slow movements, and somnolent propensities of the Wáhs are perhaps best explained. Those who would trace to full advantage the identities of organization and of economy that exist between the Potos and Wáhs, must compare at first hand the statements of Messrs. Owen and Cuvier as referred to below, with the details of this paper.

The differences are as follows. *Cercoleptes* differs from *Ailurus* by the more confined palmation of the digits (to 2nd phalanx only) by the nakedness of the soles, by the large eye, with higher contractility of pupil, by the lesser development of the external ear, by the prehensile tail, suctorial tongue, limited number of teats (two), absence of moustaches, and possibly by some diversities of dentition, though so far as may be judged by description (*Regne* II. 267) the discrepancies must be inconsiderable ; and lastly, by the non-terminal position of the upper orifice of the stomach. The identities consisting in the proportion and form of the chylopoietic viscera, in the long horned uterus, in the large bony tentorium, in the wanting clavicle, the simple anus and prepuce, and in the smoothness of the tongue, are among those best worthy of note in regard to structure, whilst in reference to manners and habits, so far as these are reported, the only differences would seem to consist in the nocturnal, not crepuscular activity of the Potos, in their honey-sucking or suctorial propensities, like to those of the Ratel and Labiate Bear, and lastly, in the greater addiction to tree haunting and to clambering there by the help of the prehensile tail. Again, the suggested Lemurine resemblances of *Cercoleptes* hold wonderfully true of *Ailurus*, and hardly less so (though this makes against the Cat-toed grouping) the Procyonine and Nasuan resemblances, as any one may satisfy himself who will compare the foregone account of *Ailurus* with what he will find in the *Regne* relative to the Lemurs* and to the Racoons and Coatis.† With respect to these Lemurine affinities, now demonstrated by science, but first suggested by unlettered

* *Regne* I. 322—332.† *And* II. 248—262.

experience, we have in the story of Bosman's Negroes as in that of Mr. Gardner's Málí, a strong proof how "practice will creep where theory can hardly soar;" for the Negroes decided before Cuvier or Geoffroy that the Potos were Lemur allies, just as the Málí multiplied his tea plants by grafting on the Camelia (Kisi) at a time when eminent Botanists held the notion to be absurd!*

That the second series of animals I have grouped together above are more nearly related among themselves than to the first series seems probable; but that the first series also blend with them in some remarkable points any one may satisfy himself by comparing Dr. Cantor's details of *Arctictis* (Journal, No. 171) and mine of *Paradoxurus* (Trans. Vol. 19), with those above given and referred to, when he will perceive that the Benturong, notwithstanding its Ailurine affinities, is linked to the Screwtails and *not* to the Wáhs, by its large linear-pupiled eyes, nocturnal habits, sub-carnivorous regimen, cæcum and euodean preputial apparatus, and to the Potos by the two first marks; whilst the peculiarities of the tails of the three animals, though not quite identical, yet constitute a common and antiailurine feature. I must not enlarge further however at present on the subject of these real and supposed affinities.

Ere long I trust to be able to complete my report of the Ailurine osteology, and in the meanwhile I shall terminate this account of the Wáh with a full statement of the dimensions of a mature male and female.

	<i>Male.</i>			<i>Female.</i>		
Snout to vent,.....	1	10	0	1	10	0
Head to the occiput,	0	5	$\frac{1}{4}$	0	5	$\frac{1}{4}$
Tail only,	1	4	0	1	4	0
Tail and hair,	1	6	0	1	5	$\frac{1}{2}$

* A fact which occurred in 1823—4, at Cathmandu, where fine Chinese tea plants have long existed, brought from China in 1790, by Cashmiris, from which Dr. Abel was abundantly and speedily supplied to his surprise, by the Málí's practical science, who when questioned by Dr. A.'s desire, *why* he had thought of grafting a *Thea* on a *Camelia*, replied with greater surprise, because the two were evidently of the same genus (*Ját*)! The Kisi is indigenous and abundant in Nepál. The teas flower and fruit abundantly, almost perpetually, but the seeds seldom vegetate. The Kisi is as abundant at Dorjiling as at Cathmandu, and the Chinese tea plant flourishes as well here as there, so that if more plantations are needed, here is a fine site for some.

	Male.			Female.		
Snout to fore angle of eye,.....	0	1	$\frac{1}{2}$	0	1	$\frac{5}{8}$
Thence to base of ear,	0	3	$\frac{1}{4}$	0	3	$\frac{3}{8}$
Ear only,.....	0	2	$\frac{3}{4}$	0	0	0
Ear and tuft,	0	3	$\frac{1}{4}$	0	3	$\frac{1}{4}$
Width of ear,	0	0	0	0	1	$\frac{7}{8}$
Girth behind shoulder,	1	1	0	1	0	0
Mean height,	1	9	$\frac{1}{2}$	1	9	$\frac{1}{4}$
Length of arm,	0	5	0	0	5	0
Length of fore arm,	0	4	$\frac{1}{2}$	0	4	$\frac{1}{4}$
Palma and nails,	0	4	$\frac{3}{8}$	0	4	$\frac{1}{4}$
Length of thigh,.....	0	4	$\frac{11}{16}$	0	4	$\frac{1}{2}$
Length of leg (tibia,)	0	5	$\frac{1}{2}$	0	5	$\frac{3}{16}$
Planta and nails,.....	0	4	$\frac{3}{8}$	0	4	$\frac{1}{4}$
Weight,	8 lbs.			7 $\frac{1}{2}$ lbs.		
				<i>Skull.</i>		
Length,.....				0	4	$\frac{1}{2}$
Height,.....				0	3	$\frac{1}{8}$
Width between Zygomæ,.....				0	3	$\frac{1}{4}$
Width inter parietes,				0	2	0
Base of incisors to fore angle of orbits,				0	1	$\frac{3}{8}$
Thence to jut of occiput,				0	3	$\frac{7}{16}$

And now, the extent to which the above paper has insensibly run, warns me to postpone my proposed remarks on the Paradoxures to a future occasion, merely referring the reader who may desire in the meanwhile to compare the organization and habits of those animals and of the Wáhs as above given, to the 19th Vol. Asiatic Society's Transactions, where he will find ample details relative to the hard and soft anatomy, and to the manners of the sub-Himalayan Screwtails, of which there are four species; one, *Nepalensis*, which is the *Grayii* of Bennett, but priorly named by me; two, *Hirsutus*, the *Bondar* of Gray, of which *Pennantii* is not a Synonyme; three, *Laniger*, an entirely new and nivicolan species clad in wool, of an uniform isabelline brown colour, and four, *quadriscryptus noster* (new?) which [is probably the *Penantii* of Gray, *Bondar verus* being unstriped, and this striped,

P. S. The following list of the species of *Paradoxurus cum Paguma*, according to various authorities, may be useful.

<i>Gray.</i>	<i>Name secundum Cantor.</i>	<i>Hodgson.</i>	<i>Habitat.</i>
1. Typus,	Hermaphrodita,	„	Deccan and Carnatic, Malay penins. and islands?
2. Bondar,	„	Hirsutus,	Gangetic provinces, passim.
3. Prehensilis,	Hermaphrodita,	„	Malay Penins. and islands?
4. Musanga,	Hermaphrodita,	„	Malay Penins. and islands.
5. Dubius,	Hermaphrodita,	„	Idem.
6. Crossii,	Hermaphrodita,	„	Idem.
7. Pallasii,	Hermaphrodita,	„	Idem.
8. Leucopus,	„	„	?
9. Larvatus,	„	„	China.
10. Trivirgatus,	Trivirgatus,	„	Malay Penins. and islands.
11. Zeylanicus,	Aureus,	„	Islands of Indian Ocean.
12. Leucomystax,	Leucomystax,	„	Idem.
13. Nigrifrons,	„	„	India: part unknown.
14. Penantii?	„	*Quadriscryptus,	Sub-Himálayas: central region.
15. Grayii,	„	Nepalensis,	Idem, Central region.
16. Laniger,	„	Laniger,	Idem: the Cachár.

Description and Analysis of the new Mineral NEWBOLDITE, sent from Southern India by Captain NEWBOLD, Madras N. I., Assistant to the Resident of Kurnool.—By H. PIDDINGTON, Curator Museum Economic Geology.

I had mislaid (that is, too carefully laid by) this specimen, and feared for a long time that I had lost it, but fortunately finding it, I have not again delayed to place it in our collection, and to give to our valued correspondent Captain Newbold the credit which he deserves for his discovery; which is that of adding not only a new mineral, but, as will be subsequently shown, establishing a new *family* of minerals, of which we may hope for more genera as our acquaintance with Indian mineralogy (perhaps we might say with mineralogy in general?) augments.

* General aspect of Bondar, but with four continuous dorsal lines and face marks as in Nipalensis. Habitat exclusively monticolous.

Our entire specimens are unfortunately very small, and thus I have been excessively cramped in my researches, for as will be seen, it is scarcely possible to obtain pure fragments even of a very small size.

I should describe it, as to external appearance and physical properties, as follows :—It is, where purest, and not weathered, of a clear apple-green, with considerable lustre on some of the facets of the numerous imperfect crystals of which it is formed, giving it the pearly glimmer of a green mica or of some of the green carbonates of Iron in a good light. Where weathered it is of a bluish grey-green, and the glance is more minutely silvery or micaceous, or at times steel-like.

Minute fragments of the pure mineral are semi-translucent at the edges, like those of fine apple-green serpentine.

When *powdered* its colour is of a very light greenish buff or fawn colour, becoming a little darker, or greenish, when exposed to a very gentle heat to drive off the little water it contains. When pulverising, if smartly rubbed or struck it emits a very perceptible odour of sulphuretted hydrogen.

Its hardness is 3-4 scratching Calc-spar, but not Fluor.

The streak is of a dirty fawn coloured white, but always with a minute silvery line at the centre where the knife has cut.

It has a slight earthy smell when breathed upon. It is brittle and easily pulverised.

The fracture is hackly, and highly glistening; the fragments are at times laminar and angular, but in truth they are so small and the nests and veins of the mineral so diminutive that it is not fair to judge of these characters. It seems to cleave readily in certain directions, but what these are cannot be judged of yet; the larger fragments incline to cubical on rhomboidal prismatic forms.

It does not soil, or mark, or adhere to the tongue on the fresh fracture.

The crystals are too small, confused and imperfect to judge well of their form, which however appears to approach to that of rhomboidal prisms.

The mineral seems much subject to decay by the oxidation of the iron, which is distinctly seen in some parts, leaving in the quartz what are called in Cornwall *vuggy* cavities (i. e. rough, jagged, and full of irregular ridges) coated with the peroxide of iron.

It occurs in very small nests and veins in masses of milk quartz. With one of the specimens of milk quartz there occurs a mass of bluish sulphate of Baryta, and another specimen is in a bluish very fine granular mass of sulphate of lime.

Its specific gravity I should estimate at about 4.25, to 4.50, calculated from a piece which was about half matrix, but this is a mere approximation.

In the tube and bulb tube it decrepitates and flies to pieces with a complete explosion, sending the fragments sharply into the face and eyes when tried on platina foil, as soon as heated; these fragments are mostly imperfectly cubical or rhomboidal.

It was found to contain about 1 per cent. of water when reduced to powder.

Nothing sublimes from it at the red heat of glass; but when driving off the water a slight odour of sulphur seems apparent from the crucible.

BLOWPIPE.—*Alone.*—A small fragment is infusible, but becomes of a dirty yellowish white, and is not magnetic. This, apart from its sulphur (subsequently shown) at once distinguishes it from Spathose Iron, for some of the green semi-transparent varieties of which, from its colour and decrepitation, it might be mistaken on mere inspection.

With Borax it is not very fusible; the bead transparent, yellowish, and slightly tinged with green.

With Soda fuses to a dirty brownish opaque bead; nothing is reduced from it; when moistened and a little fresh Soda added, the bead gives out the smell of sulphuretted hydrogen common to all the sulphates and sulphurets when heated with Soda, and it discolours silver foil.

With phosphate of Soda.—On charcoal, and the cake transferred to platina wire, a dull milk-white semi-transparent bead.

The powder saturated with Nitrate of Cobalt, and heated on platina foil, is of a dull brown.

Via Humida.—It dissolves readily in the mineral acids. Acetic acid does not appear to affect it. With concentrated hydrochloric and sulphuric acids much sulphuretted hydrogen is evolved. Boiled in nitro-hydrochloric acid it dissolves rapidly without evolution of sulphuretted hydrogen in any considerable quantity, if at all, and leaves

a flaky white residuum which coagulates into a soft globule floating on the solution, which is pure sulphur.

If the boiling is gentle the sulphur is obtained in a light flake.

The solution of the pure mineral in nitro-hydrochloric acid when filtered from the sulphur is of a pale gold colour. When evaporated it crystallised largely in minute silky needles, which appear in mamillated or concretionary heaps if the evaporation is slow. They are apparently insoluble in water, and in the mouth, with a slight astringency, (probably from the muriate of iron) they are tasteless and *lumpy* like argillaceous earth, though without any decided taste except an earthy one. The muriate of iron gelatinises amongst them. The concretions are soluble in nitric acid. At a red heat on platina they become dull but do not otherwise alter.

To re-agents the solution gives as follows:—To Sulphide Ammonium a dirty greenish-brown precipitate with black grains, which becomes of a sooty black, soluble in muriatic acid.

Yellow Prussiate of Potass very pale bluish white.

Caustic Potass very pale amber-white precipitate, plentiful.

Carbonate Potass, as Potass, but partly soluble in Ammonia.

Ammonia.—Sparingly, the reddish precipitate of iron; and a white precipitate with excess.

Tinct: galls.—Brown colour, but no precipitate.

Oxalic Acid.—A precipitate, soluble when ammonia is added.

Phosphate Soda.—White precipitate soluble in ammonia and in acids. Re-appears with Potass.

Cyanide of Potassium.—A dirty amber-coloured precipitate.

By Wollaston's process (Carbonate of Ammonia and phosphate of Soda).—A plentiful precipitate, like that of the Phosphate of Magnesia is obtained.

ANALYSIS.

I have already adverted to the extreme difficulty of obtaining any portion of the mineral pure enough for an analysis. The process adopted was to pulverise the mineral and,

1. Dissolve it in nitro-hydrochloric acid, at a boiling heat.
2. Filter to separate the sulphur and silex.
3. Burn off the sulphur from the silex.
4. Precipitate the sulphuric acid formed in the solution by nitrate

of Barium, and add the equivalent weight of sulphur to that obtained in the solid state.

5. Precipitate by carbonate of potass in excess.

6. Digest again in nitric acid and precepitate the iron from the solution by Ferro-Prussiate of Potass, allowance being made for the Iron it contains. The solution evaporated is gelatinous, and this when calcined is the earth.

The results of the best of three analysis in which the assay was obtained by picking minute fragments with the forceps and examining them by the magnifier, but of which I could only collect 7.33 grains, gave—

	Per Cent.	
Sulphur,	3.77	51.43
Silex,	0.25	3.40
Perox, Iron, 2.41. Iron,	1.68	22.92
Earth (perhaps new,)	1.31	17.86
	7.01	95.61
Water by an independent experiment,	0.08	
Loss,	0.24	3.39
	7.33	100.00

As the proportion of sulphur is so large, we may at once assume that the iron is a bi-sulphuret, in which case the 22.92 per cent. of iron would require 28.84 of sulphur ; leaving thus 22.59 per cent. of sulphur to combine with the 17.86 per cent. of the earth.

The earth is obtained in so very small a quantity that it is impossible to do more than describe it and its peculiar properties, so far as they can be ascertained with any degree of certainty, and wait till a better supply* of the mineral enables us to determine it.

This earth is of a pure white ; of a granular appearance under the magnifier, light and powdery in the crucible, and not lumpy like Alumina.

BLOWPIPE.—When heated to a white heat on Platina, no change : moistened and placed on Turmeric and litmus papers no effect, nor does it give any remarkable light.

* I have received an additional supply of the mineral, but unfortunately it is only very minute veins or nests, and this time in the red carbonate of Cerium, described in the Journal, Proceedings, July, 1846.

Nitrate of Cobalt on Platina.—A very pale and somewhat dirty lilac colour, not approaching to the blue of alumina at all.

With Borax, in considerable proportion of assay to the flux, and at both flames a perfectly colourless and transparent glass.

With Soda.—A dead white enamel: clear red glass in the flame.

Phosphate of Soda.—Opaque pearly bead, which when very small is a semi-transparent crackly one.

Via Humida.—It is insoluble or nearly so in sulphuric and in nitric acids, which last sometimes gelatinises it.

It is insoluble in the fixed alkalies and ammonia, but seems partly so when newly precipitated, in carbonate of ammonia.

Its proper solvent is boiling nitro-hydrochloric acid, with which it crystallises when a nearly saturated solution, in fine brilliant silky or pearly points and needles, which have a sweetish astringent taste like the salts of Glucina and Yttria.

The ferro-cyanate of Potassium does not precipitate it.

When tried by zinc the blue precipitate of Titanium is not produced.

No precipitate was obtained in boiling it with sulphate of potass.

It is in all states when freed from Iron perfectly colourless.

From the minute quantities in which I have been able to obtain the pure earth, and the almost microscopic nature of the assays and testings, and the different characters it presents from all the known earths, I cannot venture at present to pronounce what it may be; and indeed would not even now publish my analysis did I not conceive it just towards Captain Newbold to do so, for there is no sort of doubt that, whatever the earth may be, he has discovered a new and a very remarkable mineral, which is a double *Sulphuret of Iron and an earth!* We must wait for larger specimens to decide what the earth is.

The locality of this mineral (which should have been noted at the beginning of the paper,) is in the central range of the Eastern Ghats, between Cumnum in Cuddapah, and Gograpilly in Kurnool, a little south of the Cunnama pass. Captain Newbold says of it:—"The formation is the great diamond sand-stone which here passes into arenaceous and argillaceous slates. In the latter occur the veins in which the mineral are found, consisting chiefly of the carbonate of Cerium described in a former paper, in the Journal.

"It is associated with lead-ore (galena) which occurs in nests and

short seams, and the latter ore has in former times been diligently sought after by the natives. Numerous and half-choked up excavations are met with in the surrounding hilly jungly tracts, attesting a perseverance and spirit of research which is rarely met with in the present occupiers of the soil.

“Near the Western mouth of the pass in the vicinity of Bussurapoor and Gograpilly, are a large number of old diamond pits, sunk in beds of ground evidently derived from the plumbiferous sandstone composing the adjacent Eastern Ghats. These gravel beds, from a careful examination of the pebbles composing them, appear to have been formed for the most part by aqueous causes no longer in action. The present insignificant streams that carry off the Ghat drainage could never have spread out to such an extent as these gravel beds cover, so large a quantity of transported and detrital matter. The large size of the pebbles, the depth and present situation of the diamond beds, all militate against the supposition of their being composed of recent alluvium or detritus, now in process of accumulation.”

Extracts from a letter from Capt. JAS. ABBOTT, descriptive of his Geological and Mineralogical Observations in the Huzaree district, dated Camp Pukli, in Huzaree, 19th June, 1847.

I have now the pleasure to send you some specimens of what I conceive to be black iron ore, in small rounded masses of crystalline structure. I have with me no acids nor other tests, and my reason for supposing this an iron ore, is simply that the crystals are tetrahedral prisms, of dark brown color, and that the specific gravity seems to agree with that of the ore in question.

Whatever these ores may be, they occur in a very interesting formation of sandstone and blue mountain limestone, which commencing at the spur of a very lofty summit called Moachpoora, about 10 miles west of the Jelum, stretches W. S. W. about 40 miles, gradually dwindling in altitude and in the number of its parallel ridges, until, from having been a triple mountain, it has become a single hill of trifling altitude, intersected at Margrella by the main road from Lahore to Attok.

At the south-eastern foot of this extended ridge, large boulders of iron ore are found intermixed with the debris of lime and sandstone of the

adjacent mountain. The iron ore is of the black kind, and I should suppose, from its specific gravity, tolerably rich in metal. The great abundance of wood and of limestone offers facilities for the establishment of a foundry,—a thing greatly needed in upper India, and the accessibility of the spot to wheeled carriage and the neighbourhood of the river Jelum at the town of that name, ensures the manufacturers the benefit of water carriage to Feeroozpore, Loodiana, Bukhur and Bombay. This iron ore occurs in the main summit of the formation, Moachpoora, where Mr. Vans Agnew, in his late adventurous journey amongst the Dhoonds, saw it worked after the rude fashion of the hill tribes.

The ridges of mountain to which I particularly allude as having been visited by myself, are called Serra. They are from 800 to about 2000 feet higher than the valley of Rawulpindi. The blue limestone is veined with vivid streaks of white, and is found in enormous masses as cliffs or disjunct rocks. It will take a good polish, and if worked, might supply the whole of our upper provinces, as well as the Punjaub, with marble chimney pieces, pavements, and material for monumental sculpture. Water is very abundant, gushing in copious streams from near the summit, and of volume sufficient to turn the wheel of a saw-mill. The climate is singularly happy during the greater part of the year. The long mountain ridge intercepts the violent hot winds from the west, which on scaling its summit are tempered by the cooler strata above, and roll tumultuously down the eastern declivity, with the roar of a cascade; even then their force at that point is not very considerable. During the latter months of the rainy season parts of the hill skirt are considered unfavorable to health. Others, as Noorpoor Shahi, (a beautiful nook in the mountain) have a good reputation. The mountain itself, which is thickly wooded with box, barberry, wild pomegranate, and at the summit with fir, is habitable at a short distance from that point, and would afford a very cool residence. But the mountain is by no means worthy of recommendation as a general resort, the ridge being too sharp to afford building room and the spurs being short and abrupt. It has at present a bad name, as the resort of robbers.

From these mountains there ooze out three remarkable springs, one bearing upon its waters a scum of Asphaltum—another being impregnated with carburetted sulphate of iron, and the third having a mucilaginous consistence, being of the color of orange pulp, and if scented,

being rather pleasant to the nostrils. I express doubt, because the scent may perhaps have been derived from the bottle containing the liquid. Torches are made of the Asphalt. The second is drunk for indigestion. The use of the third is unknown. The latter I should have pronounced mucilage from decaying vegetation, had it not remained several days in a close bottle at a temperature of 95° without fermenting. The smell of the mineral water is scarcely sufferable.

From the occurrence of bitumen I have been led to anticipate the discovery of coal, and a day or two ago I stumbled upon a large boulder of crystals of lime containing lignite, of which I have the pleasure to send you a small specimen. This was in the Publi valley Huzara, about 40 miles north of the mountains of Serra. Coal would be quite useless here, where wood is superabundant: but its position in any given country is always an important enquiry.

The stratification of this formation is nearly vertical. The course of the ridge an azimuth of about 247° . Eastward the ridges, which fall into the plains, were of sandstone, wherever I came in contact with them, from Rawul Pindi, to Noorpoor: a sandstone running in parallel ridges nearly vertical, filled with sandy debris, which when washed away by the torrents, leave natural walls of rock of the most singular appearance. In this sandstone I have never discovered traces of organic remains.

The supposed iron ore is found on hills formed of debris of the lime and sandstone rocks, and lying northward of the Serra Ridges, about a mile from the left bank of Hurroo river. I could not detect any strata, the masses seemed to be scattered at random through the soil. I collected about 5 or 6 lbs. of it in the course of an hour, with the assistance of my servants. But I should doubt there being any vein in that locality that would pay the working. It must be remembered that there are masses which have been washed out in the course of hundreds of years. If I can find means of packing the Asphalt, I will do myself the pleasure to send it you. It may possibly differ in some respects from the same substance elsewhere found. I fear the other liquids would not bear the carriage.

Mr. Vans Agnew, Civil Service, and Boundary Commissioner, has just left me on an expedition northward, which promises to be interesting to science. Lieut. Young of Engineers, accompanies him.

Notice of the Cave Temples and Emerald Mines of Sakeyt, in the eastern desert of Egypt. By HEKEKYAN BEY.—Communicated by Captain NEWBOLD, M. N. I.

The following notice of the temples and emerald mines of Sakeyt, was communicated to me by my friend Hekekyan Bey, late president of the Ecole Polytechnique at Cairo, and brother-in-law to the Pasha's minister—Artim Bey.

Hekekyan Bey was educated in England, is an accomplished English, French, and Italian scholar; and well acquainted with the Turkish, Persian, Greek and Arabic tongues. His attainments in Geology, Mineralogy, Mechanics and Natural Philosophy are very considerable, and he has lately been employed by the Pasha in superintending the researches for coal in Egypt. He is one of the Presidents of the Egyptian Society in Cairo, and distinguished as being the most zealous and influential patron of literature and science in the land of the Pharaohs and Ptolemies.

It is with much pleasure that I embrace the present opportunity of thanking him for the gratification and instruction derived in the many agreeable hours I had the good fortune to pass in his society during my residence in Cairo. The following notes are nearly literal extracts from his rough journal, which were kept in English and French; and daily written out with his own hand. He proceeded in June 1844, from the emerald, or rather chrysolite mines, of Zubára, described by other writers, to those of *Sakeyt*, distant about 12 hours' travelling by the *Rieh ul Allawi*, *Oum Gemil*, and the *Rieh ul Talik*. About seven hours from Zubára up a *Rhawdi*, on the right side of Wadi Gemil, he found the ruins of an ancient station, with cisterns, mills and old gold mines excavated in veins of quartz in mica slate.

The ruins of the ancient mining town of Sakeyt are scattered on the brows of hills of mica slate walling the valley, which is about 500 ft. broad, and runs N. N. W.—distant from the summit of Gebel Sakeyt about $2\frac{1}{2}$ miles. There are here several rock cut temples; the principal of which is excavated in the schistose rock on the left side of the Wadi, and runs E. S. E., having a central altar at that extremity, on which is inscribed a triangle. The interior is whitewashed, and an illegible Greek inscription in red ochre is seen on the wall on the right

hand from the entrance; the interior measurements of the temple are about 50 ft. by 20 ft, eight feet high at the altar, and from 12 to 14 ft, high under the principal entrance. The doorways seem to have had doors or curtains and bars, once fixed to them. The workmanship is rude: from the position and general design of the temple its lateral chapels and central nave, it appears to have been once a Christian church.

About 400 yards lower down the same side of the Wadi, is another rock cut temple, much smaller in size, which contains the fragment of a Greek inscription cut into the stone along the cornice in its front.*

ΡΩΝΙΟΥ ΕΥΧΑΡΙΕΤΟΥ
ΚΑΙ ΤΙΣΙΑΙ ΚΑΙ ΤΩ ΑΠΟΛΛΩΝΙ ΚΑΙ
ΝΑΟΙΣ ΕΘΟΙΣ ΠΟΙΚΜΟΙΕΡΟΝ

ΒΕΡΕΝΕΙΚΗΣ ΚΑΙ ΤΟ
ΠΕΤΜΑΤΟΣ ΑΠΟ ΘΟΜ

The sign of a cross and a piece of a shell, such as are used in modern Greek churches, were found in the temple.

The ruins of houses are scattered around, constructed of fragments of mica schist, steatite, quartz in part coloured green by the colouring matter of the emerald, and containing crystals of emerald.

The mines appear to have been sold out to companies of adventurers, who built magazines and houses around the entrances of the excavations, of which several hundred still remain. In many instances, wherever the position of the quartz veins, and schists permitted, the whole face of a mountain has been quarried down and exposed to research.

The Zubára mines are galleries run into the mica schist; layers, containing nodules of emeraldic quartz, are often disposed so as to have a layer of quartz for their roof. At Sakeyt, on the contrary, the emeralds had been searched for in veins and layers of quartz, which is tinged purple, yellow, and red. The more transparent and white sorts, found in the debris thrown out by the ancient miners, exhibit the light bluish green of the Egyptian emerald. The schists and steatites are variously coloured, and mica occurs in golden scales. White, greenish,

* The inscription contains apparently a dedication to the Egyptian goddess Isis and to the Greek god Apollo. The cross and shell indicate it having been subsequently used as a Christian chapel.—T. J. N.

black, light pink, and dark red coloured crystals occur as well as combinations of mica with quartz.

The schistose formations rest on the granitic: which last rocks have been made use of in the *cynocephali*, seen in the vicinity and lower down in the valley. These granitic rocks rise in elevations from 600 to 700 ft. above the surface of the valleys. They are overlaid toward the summit, by a layer of micaceous quartz containing a few emerald crystals: immediately over which is a kind of (argillaceous?) schist, whose super-crust is strongly ferruginous. A large mass of calcined iron stone indicates the ancient working of this bed for iron ore; which, probably, furnished the material for the tools of the workmen.*

The mining district is confined to the hills which are enclosed in the basin of Wadi Sakeyt; and which are much lower than the high mural ridges forming the sides of the basin, and are of an irregular conical shape. They present parallel bands and waving lines of reddish quartzose matter and dark brown schists. The section of the hill over the temple presents,—in its lower portions—friable micaceous schists coloured with partial scales of iron ore; and covered with a tabular and highly sonorous bed of whitish brown quartz in parallel waved bands indicating volcanic or plutonic disturbance. There are no fissures in the curves.

Farther up the Wadi, rise hills of laminar talc with brown argillaceous layers: then mica schists of various colours, with crystallized garnet and quartz in needles. The highest summits appear to be of granite. The emerald is met with in the quartz debris of former mines, and occurs in crystals of a light bluish green attached to the quartz in mica schist.



Observations on the Language of the Goands, and the identity of many of its terms with words now in use in the Telugu, Tamil and Canarese. By WALTER ELLIOTT, Esq., C. S., Madras.

A paper by Dr. Manger, on the language of the Goands, in the March No. of the Journal, offers some interesting grounds for ethnolo-

* From the *Cynocephali* the Greek inscription and the Christian emblems found here it would appear that the mines have been worked from the era of the Pharaohs down to early Christian times.—T. J. N.

gical speculation. So long ago as 1842, a notice in the *Oriental Christian Spectator*,* alluded to the discovery of Tamil and Canarese words in the Goand language, by Mr. Loesch, a German Missionary, who soon after fell a victim to the climate. The same subject was alluded to by Mr. D. F. McLoed, in a letter to the Secretary of the Asiatic Society, in 1844;† but until the present instance no vocabulary, it is believed, (with the exception of a short list in No. CXLV. of the Journal,) has been published, from which an opinion could be formed of the extent to which the admixture of the dialects of southern India, prevails in the present speech of these wild tribes.

A very superficial examination of Dr. Manger's list is sufficient to show that more than one half of the terms set down by him are identical with, or approximate very closely, to words now in use in the Telugu, Tamil and Canarese tongues. In a corresponding list which accompanies this paper I have noted such words as occurred to mind, and a more careful examination would doubtless elicit more.

The investigation of the different races that constitute the Hindu population of India has hitherto received less attention than the subject deserves. Beyond the fact that all the spoken dialects of India proper, are referrible to two great divisions, which the natives themselves recognize under the titles of Pancha-Goura, and Pancha-Dravira, —but little is known of the general relations and affinities of the people using them. According to Colebrooke, the central seat of the former was Canouj,‡ the capital of the Canya cubjas, from which point its cognate dialects spread both east and west, and then stretch far to the south and southwest, over Maharashtra, extending down the Malabar coast even to the vicinity of Mangalore.§ The southern dialects have generally been considered to commence from the neighbourhood of Beder, near which the limits of the Mahratta, Canarese and Telugu, meet. Dr. Manger's Vocabulary at once carries us to the Nurbudda, and it is not improbable that similar dialects may be discovered in the mountainous region on its northern band, and even in Bundelcund.

The first question that arises is, whether these two classes of languages indicate the contemporaneous existence of two great aboriginal

* Vol. iii. p. 240.

† *Friend of India*, 1844, p. 203.

‡ Asiatic Researches, vol. VII. p. 220. Goand.

§ A dialect of Concani is spoken in all the tract north of Sadashcoghur, and Mahratta is the language of the mountains immediately above it.

racés inhabiting the northern and southern portions of India, or whether the people using the southern language at one time occupied the whole extent and were gradually driven southwards by the pressure of a new race of invaders from the north. The isolated existence of a cognate dialect of the south, among a wild tribe inhabiting unapproachable forests and fastnesses considerably to the north of the present range of these languages, is in favor of the latter supposition. But a single fact affords too narrow a basis on which to build so important a hypothesis.

The opinion of Mr. Colebrooke regarding the derivation of the Hindi or northern dialects from Sanscrit, has not found favor with Oriental philologists, and seems no longer tenable. But its influence on all the languages now in use, whether in the north or in the south bears incontestible evidence of the sway of a people vastly superior in power and civilization to the aboriginal races. All the written characters now in use, as has been proved by James Prinsep, have been derived from that source, and the very number of the letters, their classification and arrangement, are the same in all the languages of the north and of the south, except the Tamil, the most remote of the southern dialects. It is not only singular in wanting the regular series of aspirated consonants, but the number of simple consonants and vowels likewise falls short of those of all the others. It has besides, letters to express sounds peculiar to itself, and others which receive new powers by reduplication.* This fact would seem to indicate the gradual retrogression of the great southern race to the extreme verge of the peninsula, where it preserves the most distinctive marks of its original character. But whether this was owing to the growth of the power and the extended conquests of the Hindi tribes or to the silent progress of the Bráhmical faith and literature, or, as is most likely, to both of these combined, —remains to be ascertained.

In looking at the comparative list of words it will be observed that a considerable number of Goand words† are derived from the northern stock, as was likely to happen from the influence of the surrounding dialects. But the same effect is observable even in Telugu and Cana-

* Thus double rr and double dd become tt, double bb becomes pp, and double ss serves for ch.

† As *Boy, Girl, Horse, Ass, Goat, Twenty, Fifty, &c.*

rese, where Sanscrit terms,* have in general instances superseded the original words. The influence of the Urdú on Goand is also perceptible in the ten Commandments, and Sand Sumjee's song, where we find such terms as *admee* man, *hazar* 1000, *kám* business, *labari-gohai* false witness, *khobar* news, *kuan* well, *tisra din* third day, *hath* market, *guttri* bundle, *ghossa laga* become angry, *pucha* question, *thera kya* established, and the particles *jub* when, and *keh* that.

The similarity of grammatical construction between the Goand and southern languages is apparent in many respects, but in this part the Vocabulary seems rather defective.

The plural is formed by the addition of *k* in Goand, and by *kal* and *gal* in Tamil and Canarese. The objective cases which terminate in *na* and *un* in the former, are formed by *in* the genitive, and *nu* the accusative, in Tamil and in Canarese. The structure of the verb, as far as it can be learned from the examples given, also presents many analogies. The present and some of the other tenses in Goand are derived from the present and conjunctive participles without personal terminations, in this respect corresponding with the formation of the Malayalem verb, (Peet's Malayalem Grammar, p. 60.) which is also without inflections. The past and future tenses show some traces of resemblance to the Canarese and Tamil, both in their formation and in their personal terminations. The large employment of auxiliary verbs in the southern dialects is not perceptible in the Goand specimens of construction, unless it be in the formation of the passive by the use of *howe*.

These hasty remarks have been thrown together in the hope of showing how wide a field is open for further investigation, not with the idea of communicating valuable results. The Vocabulary and specimens are too scanty and imperfect to make the institution of more careful comparisons worth while at present. The Goand words too seem to have suffered considerable mutilations and changes at the hands of the printer, which renders it hazardous to venture on conclusions drawn from less obvious resemblances. It is to be hoped that more attention will be given to so interesting a subject, and the publication of a well selected Vocabulary† of terms for general adoption as promised by the Editors, will greatly facilitate the labours of future inquirers in this field.

* As in *day*, *man*, *twenty*, &c.

† See foot note, p. 286.

N. B. The orthography of the words in the Southern dialects is according to Sir William Jones' system, now generally employed by all Oriental scholars. The Tamil *ḷ* is represented according to Ellis, by zh.

English.	Goandi.	Telugu.	Tamil.	Canarese.	Maratta.	Sanskrit.	Malayalem.	Todava.
Head,	Tulla,	Táíá,	Tálé,	Tálé,	..	..	..	..
Forehead,	Kuppar,	..	..	..	Kapal,	..	..	..
Eyebrows,	Kunkunda,	Kanubóma,	..	..	..	..	..	..
Eyes,	Kunk,	Kannu,	Kán,	Kannu, vul- go Kann,	..	..	Kón.	..
Nose,	Mussair,	Múckú,	Mucku,	Mugu,	..	..	Mucka,	Muttuvan.
Ears,	Kohis,	..	Kadu,	Kivi,	Kan,	Karna,	..	Kevvi.
Mouth,	Tudhi,	..	..	..	Tond,	Tunda,	..	..
Teeth,	Pulk,	Pallu,	Pallu,	Pallu(A.C.)*	..	..	Pallu,	Purr.
Throat,	Gunga,	Gontu,	..	Hallu,	..	Kant'ha,	..	Kempakudr
Armpit,	Kauku,	..	..	Kenkalu,	Kakh,	Kaksha,	..	..
Stomach,	Pir,	Potta,	..	Hotte,	..	Petari,	..	..
Entrails,	Puddu,	Pegu,	..	Potte(A.C.)	..	..	..	..
Back,	Murchur,	..	Mudugu,	..	..	..	..	..
Feet,	Kal,	Kalu, vul- go Kal,	Kalu, ditto,	Kalu, ditto,	..	..	..	..
A boy,	Perga,	..	Payyan,	Hudaga,	Porga,	..	..	..
A girl,	Pergi,	Pilla,	..	Hudigi,	Poragi,	..	..	..
Firewood,	Kuttia,	Katte,	Katti,	Kattigi,	..	Kasta,	..	..
Salt,	Sowur,	Choudu,	..	..	Soulu,†	..	..	Enneye.
Oil,	Ni,	Nune,	Ennie,	Enne,	..	..	Enna,	..
Milk,	Pal,	Palu, vul- go Pal,	Palu, ditto,	Hal or Halu Pahu (A.C.)	..	..	Pal,	..
Butter,	Nemi,	Venna,	Venne,	Benne,	..	..	..	..
Bullock,	Koda,‡	Kode,	Kedari,	Hori,	..	..	..	..

* A. C. means an-
cient Canarese, or the
Hella Canada dialect.

† The correct word
is "uppu," but the
impure *Earth salts*
generally used in the
interior as a substi-
tute, is called Sowla.

‡ A young bullock
of 3 years old.

English.	Goandi.	Telugu.	Tamil.	Canarese.	Maratta.	Sanskrit.	Malayalem.	Todava.
Bambu,	Wuddu,	..	..	Biduru,	Vélu,	Vénu,	..	..
Leaves,	Aki,	Aku,	..	..	..	..	..	..
A tree,	Murra,	Manu,	Maram,	Mara,	..	..	..	..
A flower,	Pungar,	Puvvu,	Pá,	Hú, Puvvu,	P'hál,	..	Mara,	..
A Tamarind tree,	Chitta,	Chinta,	..	..	Chinch,	..	..	..
Sagun tree,	Teku,	Teku,	Teku,	Tegu,	..	..	..	..
Peepul,	Ali,*	..	..	Arali,	..	..	..	..
Not, No,	Hille,	..	Ille,	Ille,	..	..	..	..
Yes,	Hinge,	..	..	Houdu,	Hoyé,	..	..	..
Before,	Nunne,	Mundara,	Munné,	Mundé,	..	..	..	..
Within,	Rupper,	Lopala,	Naduvé,	Nádu,	..	..	..	..
Between,	Nuddum,	Naduma,	Pinné,	..	..	..	..	..
Behind,	Pija,	..	..	..	..	..	..	..
Above,	Furru,	..	Inge,	..	..	..	..	..
Hither,	Hickki,	..	Ange,	..	..	..	..	..
Thither,	Haikki,	Akkada,	Indruki pronounced Indsike,	..	..	..	..	..
Now,	Indike,	..	To-day,	Iga,	..	..	..	..
When,	Boppor,	..	Eppo,	..	..	..	Eppoz,	..
Here,	Iga,	..	Inge,	..	..	..	..	..
Daily,	Dink,	Dinam,	..	Ille,	..	..	Devasina,	..
One,	Undi,	..	Onnu,	Dina-dina,	..	..	Onnu,	Won.
Two,	Rund,	..	Rendu,	Ondu,	..	..	Randu,	Edd.
Three,	Mund,	..	Munru,	Eradu,	..	..	Munru,	Mudd.
Four,	Nalo,	Nalugu,	Nalu,	Muru,	..	..	Nal,	None.
Five,	Saiyan,	Edu,	Eanye,	Nalku,	..	..	..	..
Six,	Sarun,	Aru,	Aru,	Eedu,	..	..	..	..
				Aru,	Saha,	Shat,	Aru,	Ore.

* In Tamil the Ba-
nian is ala.

† Pichi, (Hindi.)

Seven,	Era,	Edu,	Ezhu,	{	Elu,	Sate,	Sapta,	Ezu,	..
Ten,	Pudth,	Padi,	Pattu,	{	Hattu,	..	..	Patt,	Pottu.
Twenty,	Visa,	..	..	..	Pattu,(AC.)	Vis,	..	..	..
Fifty,	Pannas,	..	..	..	..	Pannas,	..	..	..
Hundred,	Nur,	Nuru,	Nuru,	..	Nuru,	..	..	Nur,	{ Onnur, i. e. one hundred
A Horse,	Kora,	..	Kudera,	..	Kudere,	Ghoda,	Manushya,	Kudara,	..
A Man,	Manda,	Manushi,	..	..	..	..	..	Nelam,	Nelan.
A field,	Nela,	Nela,	Nelam,	..	Nela,	..	..	..	..
A she-goat,	Buckral,	..	..	..	Handi,	Bakri,	..	..	..
A Boar,	Puddhi,	Pandi,	Panni,	{	Pandi,	..	..	..	..
I,	{ Nak or	Nenu,	Nan,	..	..	..	..	Gnun,	One or On.
My,	Nanna,	..	..	..	Nanna,	..	..	Enra,	..
Me,	Nowa,	Na,	..	..	Nanna,	..	..	..	..
Thou,	Nakum,	Nannu,	..	..	Ninu,	..	..	..	..
Thy,	Emma,	..	Un,	..	Ninna,	..	..	..	..
He,	Newa,	Ni,	..	..	..	..	..	..	..
His,	Wur,	Wadu,	..	..	..	..	..	..	..
Him,	Wanna,	Wani,	..	..	..	..	..	..	..
By him,	Wunk,	Wanni,	..	..	..	..	..	..	..
We,	Wunk sun,	Wani cheta,	..	..	..	..	..	..	..
Out,	Wak,	Memu,	Nam,	..	Nawu,	..	..	..	..
You,	Woman,	Ma,	..	..	Namma,	..	..	..	..
They,	Mekum,	Miru,	..	..	..	..	..	..	..
Their,	Wurg,	Waru,	..	..	..	..	..	..	..
Them,	Wuran,	Wari,	..	..	..	..	..	..	..
By them,	Warran,	Warini,	..	..	..	..	..	..	..
She or it,	Warransum,	Wari cheta,	..	..	..	..	..	..	..
	Ud,	Adi,	Adu,	..	Adu,	..	..	..	..

The following words are taken from the Ten Commandments and the song of Sand Sumjee.

English.	Goandi.	Telugu.	Tamil.	Canarese.
Name,	Parral,	Peru,	Per,	Hesaru,
Mother,	Awa,	..	Tai,	Awa,
Elder brother,	Tunna,	Anna,	Anna,	Anna,
Younger brother,	Tumma,	Tamudu,	Tambi,	Tamma,
Hear,	Kuyat,	..	..	Kélo,
They heard,	Kineh turg,	..	..	Kelidaru,
To born,	Wattoni,	..	..	Húttóna,
Dead,	Satur,	Satchu,	Sattu,	Sattu,
Having taken,	Techi,	Techi, having brought,	..	..
He shall take,	Yetanur,	..	..	..
Bringing,	Pullana,	..	..	Tarona.
He put on,	Yetum,	Yetu,	..	Yeti kondan.
Ask,	Keat,	..	Kelu,	Kelu.
He said,	Indal atur,	..	..	Helida.
They asked,	Keal atur,	..	..	Kelidaru.
Feeding,	Thekana,	..	..	Tinsona.
A child or cub,	Murri,	..	..	Mari.*
A puppy,	Napila,	Kuka pillá,	Nai kuti,	Nai mari.
Meat or flesh,	Khandk,	..	..	Khanda, a morsel or bit of flesh.

* The term *mari* in Canarese expresses the young of any animal, while *kusa* in Can. and *pilla* in Telugu are exclusively applied to young child. The Goands seem to apply *murree* to the young of man and animals indifferently. See Sand Sumjee's song.

NOUNS ARE THUS DECLINED.

	Goand.		Canarese.		
	Singular.	Plural.	Singular.	Plural.	
1st Declension.					
Nominative,	Kora,	Korank,	Kudare,	Kudaregalu,	Horses.
Genitive,	{ Korana, or Koradd,	{ Korankna,	Kudareya,	Kudaregala,	Of a horse,
Dative,	{ Korat, or Koratun,	{ Korunkun,	Kudarege,*	Kudaregalige,	To a horse,
Accusative,	{ ..	{ ..	Kudareyannu,	Kudaregalannu,	Horse,
Ablative,	Koratsun,	Korunksun,	Kudareyinda,	Kudaregalinda,	By a horse,
2d Declension.					
Nominative,	Gohk,		Godhi,	..	Wheat.
Genitive,	Gohkna,		Godhiya,	..	Of wheat.
Dative,	Gohkun,	No plural,	Godhige,	..	To wheat.
Accusative,	..		Godhi yannu,	..	Wheat.
Ablative,	Gohksun,		Godhi inda,	..	By wheat.
3d Declension.				Telugu.	
Nominative,	Pindi,		Pindi, or	..	Otta or flour
Genitive,	Pindena,		Pindi,	..	Of otta.
Dative,	Pinditun,	No plural,	yoeka,	..	To otta.
Accusative,	..		Pindiki,	..	Otta.
Ablative,	Pinditsun,		Pindi,	..	With otta.
			Pindito,	..	

* Pronounced hard as
in *get*.

PERSONAL PRONOUNS.

Goand.	English.	Telugu.	Tamil.	Canarese.	Malayalen.	Tuluu.	Coorg.	Todava.
Nak, or Nanna,	I,	Nenu,	Nan,	Nanu,	Nyan,	Yanu,	Nan,	Won.
Nowa,	My,	Na,	En,	{ Nanna, Enna,	{ Enre,	Yana,	Enna,	Enna.
Nakun,	Me,	Nannu,	Ennai,	{ Nanna, Enna,	{ Enne,	..	Enna,	Enna.
Naksun,	By me,	Nacheta,	Ennale,	Nanninda,	Ennal,	..	{ Ennam Gonda,	Ennadd.
Imma,	Thou,	Nivu,	Ni,	Ninu,	Ni,	..	Nin,	Ni.
Niwa,	Thy,	Ni,	Un,	Ninna,	Ninre,	..	Ninna,	Ninna.
Nikun,	Thee,	Ninnu,	Unnei,	Ninna,	Ninne,	..	Ninna,	Ninna.
Niksun,	By thee,	Nicheta,	Unnal,	Ninninda,	Ninnal,	..	{ Ninnan Gonda,	Ninnidd.
Wur,	He,	Wadu,	{ Avan, Awar,*	{ Avanu, Awaru,*	{ Avan, Awar,*	..	{ Av, Avana,	{ Ad, he, she, it.
Wunna,	His,	Wani,	Avanudaya,	Avana,	Avanre,	..	Avana,	Adana.
Wunk,	Him,	Wanni,	Avanai,	Avanna,	Avane,	..	Avanam,	Ad.
Wunksun,	By him,	Wanicheta,	Avanal,	Avaninda,	Avanal,	..	{ Avanam gond,	Adanad.
Mak,	We,	Memu,	Nangal,	Navu,	Nam,	..	Eng,	Wom.
Mowan,	Our,	Ma,	Engal,	Namma,	Nammude,	..	Engale,	Ennadd.
Makun,	Us,	Mammuna,	Engalai,	Nammanu,	Nangle,	..	Engale,	Em.
Maksun,	By us,	Macheta,	Engulale,	Namminda,	Nummal,	..	Engale gond,	Enmadda.
Imat,	You,	Miru,	Ningal,	Nivu,	Ningal,	..	Ning,	Nim.
Miwan,	Your,	Mi,	Ungal,	Nimma,	Ningalude,	..	Ningale,	Nimma.
Mekun,	You,	Mimmuna,	Ungalai,	Nimmana,	Ningale,	..	Ningale,	Nimmana.
Miksun,	By you,	Micheta,	Ungalal,	Nimminda,	Ummal,	..	{ Ningalam goond,	Ninimid.

* Used of dignified or respectable persons.

Wurg,	They,	Waru,	Avargal,	Avaru,	Avargal,	Ad.	..
Wuran,	Their,	Wari,	{ Avargal- daya,	Avara,	Avargal,	Ad.	..
Wurun,	Them,	Warini,	Avargalai,	Avanna,	Avare,	Ad.	..
Wurunun,	By them,	Waricheta,	Avargalale,	Avanda,	Avargal,	Ad.	..
<i>Demonstrative.</i>							
Yirg,	This,	Idi,	Idu,	Idu,	Ida,	Ad.	..
Ad,	He, she, it,	Adi she or it	Adu, it, that,	Adu,	Ada,	Ad.	..
Ten,	Him,	{ Tannu, re- flective pro- noun,	{ Tannai,	Tanna,	..	Tan,	..
Yirg,	These,	Ivi, They.	..	..	..	..	..
	<i>Goond.</i>	<i>English.</i>	<i>Telugu.</i>		<i>Malayalem.</i>		
Imperative,	Winka,	Speak,	Wagu,	Sound, prate	Para,	..	..
Infinitive,	Wankunna,	To speak,	Waga,	To prate,	Parayun- nadu.	..	..
Present part	Wunki,	Speaking,	Wagutu,	Prating,	..	..	..
Past part.	Wunktur,	Spoken,	Wagina,	Prated,	Paranya,	..	..
Conjunc- tive part.	Wunkei,	Having spoken,	Wagi,	Having prated,	Paranyi,	..	..
<i>Present tense.</i>							
Nunna	{ I speak,	{ Nenu va- gutanu,	{ I prate,	{ Nanpara- yunnu,	..	..	..
vunki,	{ Thou	{ Nivu va- gutavu,	{ Thou	{ Ni para- yunnu,	..	..	..
Imma	{ speakest,	{ vadu va- gutadu,	{ He prates	{ Avan pa- rayennu,	..	..	..
Wur wunki,	{ Hespaks	{ Memuva- gutamu,	{ We prate,	{ Nam pa- rayunnu,	..	..	..
Mar wunk,	{ We speak	{ Miru va- gutaru,	{ You prate	{ Ningul pa- rayunnu,	..	..	..
Imar wunki	{ Ye speak,	{ Waru va- gutaru,	{ They	{ Avar pa- rayunnu,	..	..	..
Warg	{ They	{ speak,	{ speak,	{ rayunnu,	..	..	..
wunki,	{ speak,						

- { *Goand.*—Sandsumjee, na saka.
 { *English.*—Sandsumjee's song.
 { *Canarese.*—Sandsumjee-ya Hadu.*
 { *Goand.*—Sandsumjee, na saka kuyat ro Baban.
 { *English.*—Sandsumjee's song hear, O Father.
 { *Canarese.*—Sandsumjee-ya Hadu* kelu Ele uppa.
 { *Goand.*—Sark ask kitur sing Baban hille puttur.
 { *English.*—Six wives he took, Sing Baba not born.
 { *Canarese.*—Aru hendarannu madicondanu Sing Baba Huttalilla.
 { *Goand.*—Yirrun ask kitur awite Sing-baban autarietur.
 { *English.*—Seventh wife took by her Sing baba was conceived.
 { *Canarese.*—Elne Hendati yennu madicondanu Avalu Singu babannu garbhadali dhariudalu.

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*Some notes on the Botany of Sinde, by Captain N. VICARY, 2nd European Regt.*

The following notes have been made from plants, collected under considerable difficulties, at seasons (Dec. Jan. Feb.) the worst that could be selected for collecting plants, or when I was accompanying an army in an enemy's country, with scarcely the means of transporting my private baggage.—I mention this merely to show that much remains to be done of botanical interest in Sinde, and that my collection gives but a limited, although a characteristic idea of the plants that flourish in that region. The Flora of Sinde falls naturally into three divisions, that of the hills, the plains, and the coast. The hills being either the bases or out-liers of the Hala range, are barren in the extreme, owing to the want of rivers, the rareness of natural springs, their saline nature where they do exist, and the absence of periodical rains.

Little that could be called soil exists; a few of the intervening valleys only are favored with arable land.

The hilly country generally presents a most desolate and barren appearance—little vegetation meets the eye—scarcely anything but the bare, broken, pale or rusty yellow Tertiary strata, of which they are composed. My Beloch guides informed me that rain at a proper season falls on an average about every fourth year, that shortly afterwards vegetation appears abundantly, and that on those occasions the Beloches are in the habit of collecting and storing dried grass; at such seasons the botanist would doubtless find much to excite attention, but at any time the few plants found are very interesting.

\* Pronounced long.

A species of Palm is very abundant in this division, near springs and lining the banks of water courses. If not new, I believe it to be *Chæmerops humilis*, but I have seen neither flowers or fruit. The tree has scarcely any stem above ground; the leaves are flabelliform, and the petioles channelled with lacerate stiff margins. The denuded and dry spadix of one tree which I saw was about 6 feet high, with numerous lateral branchlets. The Belochées, make sandals of the leaves of this tree. A *Viola* is found near water courses, nearly allied to if not identical with *V. patrinii*.

A species of *Reamuria*, with leaves differing somewhat from the described kinds, also exists on the tops of some of the lower hills. This, and a *Scrophularineous* plant (*Anticharis*) are the most ornamental plants found in the lower Halas.

A *Grewia*, allied to *G. sapida*, forms small shrubs rising from the fissures of the rocks; its small red berries are eatable.

*Orygia trianthemoides*, is found near the base of the hills, *Hep-tophyllum tuberculatum* in the upper valleys, and *Peganum Harmala* everywhere. I found *Tribulus alatus*, Del. and *Calligonum*, both Egyptian forms, at the base of the hills; a species of *Zygophyllum*, differing little from *Z. simplex*, is found forming dense matted beds near springs in the upper valleys. *Seetzenia*, a Sierra Leone genus, is abundant both in the hills and at their bases, also a new species of the Cape genus "*Monsonia*,"—*Neurada procumbens*, an Egyptian or Arabian plant, is plentiful on the borders of the Sindé desert, and also in the hills, is particularly plentiful too near Shahpoor on the western border of the desert. On the sand hills at the same place I found species of *Rhazya*; it is a pretty small shrub with so much the habit of the garden Oleander that our sepoys called it "*Bun Kunale*." It is also found throughout the hills but invariably in sandy places.

A species of *Forskalea*, with ovate leaves, is abundant in some places amongst the hills; the leaves of this plant adhere to everything with great tenacity and can only be removed piece meal; the whole plant is clothed with sharp hooked hairs.

A *Sophora*, with pretty yellow Laburnum-like flowers, is also found amongst rocks near water, accompanied by *Linaria ramosissima*, and a variety of *Lindenbergia urticæfolia*. Several species of *Salsolæ* are also abundant. One in particular in the hilly country with terete

pungent leaves, and axillary capitate inflorescence, of which unfortunately I am without specimens. A new species of the African genus *Limeum*, is also found on the skirts of the Halas. *Plantago amplexicaulis*, is found in the inner valleys along with *Haplophyllum*. An *Echium* of the Cape type, and possibly new, and *Trichodesma Africanum*, B. B. are abundant in the fissures of rocks midst the higher hills.

*Salvia primula*—*Ægyptica*, and a new species of the same section, are widely spread through the hills. A new *Linaria*, very like *L. triphylla*, is found from the base of the hills upwards.

*Solanum Forskalii*, or a species akin to it, is also abundant. *Hyocyanus muticus* is found in moist places. An *Asclepiad*, with the habit of *Orthanthera viminea*, is very abundant on the margins of water courses. It forms a large bushy shrub, and I suspect is the same plant described by my friend Dr. Falconer as "*Campelepis*." *Cometes Surattensis* is found occasionally along the whole base of the Hala mountains; a *Caralluma* or some nearly allied plant is abundant on the higher ranges, but I never saw it in flower; a new and pretty species of *Cleome* is found in the passes leading into the Hala range at a low elevation: with this I close my notice of the hilly region of Sindé.

The plains of Sindé are of a very variable character, some places being very fertile, and others barren, and naked desert with little to be seen except *Salsolea* and *Tamarisk*, and even these affect the borders of desert places.

The *Tamarisk* on the borders of the desert in some places yields a considerable quantity of manna, it exudes from the bark of the younger branches in the form of translucent tears. It is collected in some abundance in the neighbourhood of Meher, south of Larkhana, and used to adulterate sugar; my servants eat a considerable quantity of it without being in any way affected. In fact they were wonder-stricken and returned thanks to God for having miraculously created sugar in the desert jungle. I had about a seer of it for near a year, it remained unaltered, and was at last destroyed by exposure to rain.

This species of manna is noticed by Doctor Royle in his *Illustrations of Botany*, p. 214. I saw neither flowers nor fruit, so cannot speak as to the species, but the shrub has the habit and appearance of *T. gallica*.

The little desert of Sindé flanks the base of the Hala range, varying from 10 to 25 miles (or more) in breadth, extending in a southerly direction to beyond Meher, where it narrows to three or four miles, and there are more or less extensive patches of desert nearly as far south as the Munchaul Lake. In a northerly direction branches of the desert extend to near Mittun Kote, flanking the base of the Boogtee Beloch Hills (spurs of the Halas) upon which Deyrah and Kahun are situated. This tract is sometimes called the Burshoree desert, from the name of a halting-place on the other side, N. W. of Shikarpoor. The soil is a hard baked yellow clay, often exhibiting proofs of lacustrine or alluvial origin, generally extremely arid and devoid of all vegetation. In some places even in the heart of the desert *Salsolæ* are abundant, in others the surface for miles is perfectly naked; in many places saline matter abounds, efflorescing and whitening the surface, or cementing the soil, which crackles under the feet as if icebound; saltpetre is or has been manufactured at the southern end of the desert. It will be seen that but for the Indus this desert would form a branch of the great Jeyzulmeer desert, which in some places south of Bhawulpoor, approaches the Indus so closely that its sands are poured into the stream, hence we may expect the vegetation on the borders of both to be somewhat similar.

Not far south of Bhawulpoor a species of "*Anabasis*," very like (if not identical with) *A. florida*, makes its appearance; this plant abounds on the borders of the desert and on both banks of the Indus wherever the desert approaches.

The borders of the Sindé desert are usually belted with sand hills, and outside them a belt of *Acacia catechu*, of greater or less breadth.

I have already noticed *Monsonia* as existing on the western borders of the desert, I also found it in desert places in lower Sindé.

*Antichorus* (*Corchorus*) *depressus*, abounds on the desert borders, particularly at Khangurh; *Physalis somnifera* is also found here, and extends into the hill valleys. In lower Sindé, south of Sewan, a species of *Euphorbia*, very like *E. pentagona*, abounds in many places forming impervious patches of jungle; near Kotree, and also between that place and Sewan I found an "*Ochradenus*," I believe identical with the Egyptian *O. baccatus*, *Delisle*. *Fagonia* is abundant throughout Sindé,



both in the hills and plains, I have no specimens, but considered the species to be *F. Mysorensis*, the flowers are pale purple.

At Meher and some other places a species of sugar-cane is in cultivation, which I believe to be unknown in India; it is called "Buhadoo-ree;" the stems are slender and trailing; they grow to ten or fifteen feet in length, the base not being thicker than a finger; ten or twelve are usually fastened together so as to afford mutual support; the cane is said to yield the best sugar, but in small quantity. *Cleome ruta*, Jacqt. is abundant on the rocks at Sukkur, and throughout Sindé. *Typha angustifolia* is found on most lands subject to the annual flooding of the Indus, and from it vast quantities of mats are manufactured. A species of *Adenanthera*, I believe *A. pavonia*, is often found near villages in lower Sindé; this tree has a weeping habit, and at a distance looks not unlike *Salix Babylonica*. A remarkable species of *Acacia* is also found near villages. In its mode of growth and appearance it strongly resembles the funereal Cypress. The Sindeans call it "Caubool-lee Baubool," a name which points to its foreign origin.

I was not fortunate enough to see this tree either in blossom or fruit. Between Kotree and Kurrachee I noticed a species of wild cotton trailing up trees to 20 feet; I was sick in a Doolee at the time and unable to take specimens.

*Dodonæa Burmanniana*, and I believe another species, are found in Lower Sindé. *Aristolochia bracteata* and a *Verbena* akin to *V. officinalis*, but perhaps distinct, exist on the smaller hills of lower Sindé; *Orphanthera viminea* abounds throughout Sindé and is a very useful plant; like many others of its order, the bark yields a strong fibre; in this shrub it is of greater length than perhaps in any other *Asclepiad*. I am not aware of the fibre being used by the Sindeans, but the thin osier-like branches are bruised and twisted into a strong coarse kind of rope in common use.

There are also numerous well known Indian forms of plants in the plains of Sindé, particularly near the cultivated districts, of which I took neither notes nor specimens; the date flourishes in several parts of Sindé, but thrives best at Sukkur, and its vicinity, on both banks of the Indus. There are two varieties. One with pale yellow, and the other with brown fruit; the fruit is smaller than the Egyptian date, but when ripe is very palatable; only certain trees produce good fruit, about

a-third of the whole perhaps. The fruit of the remainder is injured by tapping for the juice, from which sugar is manufactured.

The plants of the coast are of a mixed and peculiar character, and many of them belong to more northern genera. *Serræa incana*, Cav. grows plentifully on the sand hills of the coast; the only known species of this genus, is a native of Succotra, and is described as being only three inches high. The Kurrachee plant forms a bush two feet in height, and when in flower is very pretty; perhaps it may be a new species?

A very hoary *Atriplex*, not far removed from *A. verruciferum*, is also very plentiful; *Ipomæa bilobata* spreads over the sand in every direction, and *Scævola Taccada*, Roxb. is abundant on the tops of the sand hills, the berry is white at first but turns purple when ripe. A new species of *Ægialitis* is also found all along the coast, and a new shrubby plant of the *Paronychiæ*, with the bark and almost the leaves of an *Equisetum*.

*Cadaba Indica*? grows on the rocks at Minorâ point; I also noticed this plant in the Hala mountains, but am rather doubtful as to the species; I have only seen the cucumber-shaped fruit which is made into a pickle by the Sindeans.

I shall now proceed to notice seriatim, such plants of my Herbarium as appear to me deserving of elucidation.

#### *Umbelliferæ.*

Indigenous plants of this class are rare in Sindé; I have but one specimen from the Hala mountains which for the present I have referred to

1. "Libanotus;" the plant smells strong of *asafœtida*.

#### *Rhizophoraceæ.*

I found a fresh flowering branch of a tree of this class floating in the surf on the beach at Kurrachee, but no where detected living trees.

2. It belongs to the Genus "*Ceriops*" of Arnott; the many mouths of the Indus will doubtless afford others of this order.

#### *Cruciferæ.*

3. A species of *Farsetia* abounds from Bhawulpoor, throughout Sindé; it is often the only food procurable for camels, who eat it greedily, along with a frutescent *Crambe*? In the Hala mountains it is used for the same purposes. The plant of this order, along with some others, will form the subject of a future communication.

*Capparideæ.*

4. *Cleome ruta*, *Jacqt* : Sukkur and other rocky places in Sind. The petals are pink, and bear at base of each a fringed scale.

5. "*Cleome fimbriata*, *Vic* : lower hills in Sind.

Stems and leaves hispid from gland-capitate stiff hairs; leaves all simple, lower ones long petioled, round-cordate, quintuple-nerved, outer lateral nerves lost in the margin, three medial nerves stronger and inarcuately reaching the apex. Upper leaves smaller, subconform narrower, subsessile, flowers pale purple? from the terminal axillæ; pedicels lengthening in fruit; calyx clothed with gland-capitate hairs. Sepals 4; subequal, lanceolate. Petals 4; shortly clawed with acute oblong-deltoid laminæ, apices bearing out gland-capitate hairs, and ciliate with them. Bases toothed slightly on the margins and bearing above claw transverse free fimbriate petaloid scales. Fertile stamens 4, rather longer than petals, one anther larger, torus small. Ovary subsessile, linear, rather rough; style caducous, cylindric, short; stigma discoid, capitate. Capsule linear-cylindric furrowed on opposite sides, shortly stipitate, densely clothed with strongly stipitate, peltate glands, 1 celled, 2 valved, valves separating from the placentiferous narrow replum, seeds most numerous, cordiform, smooth, amphitropous. I have given my note of this plant, as it seems to be not far removed from *C. Droserifolia*, *Del* : and perhaps eventually it may prove to be the same.

6. *Cleome rupicola*, *Vic* : passes leading into the Hala range of mountains and lower hills.

This plant is not unlike *C. glauca*, *Dec.* Vol. I. p. 239, but the stems and leaves of my plant are clothed with scattered gland-headed hairs, and young branches are 4 angled. Leaves elliptic, ovate and obovate, petiolate, upper leaves reduced to linear-lanceolate bracts. Racemes often 6 inches long. Petals orange-rufescent, secund, smooth stamens secund, in an opposite direction to petals, 6; gland of the torus semilunate, siliques pendulous, falcate, flat, subsessile, 15 lines long, 2 lines broad, bearing some scattered capitate hairs; seeds densely beset with brown hairs, numerous.

7. *Cadaba Indica*? on rocks near Kurrachee and Hala mountains.

I am doubtful about this plant, having seen it only in fruit. The leaves near the apices of branches are often supported by two stipulary

thorns. The fruit is nutant, longly stipitate and cucumber-shaped bluntly trigonal, 3 to 4 inches long and turning red when ripe.

*Resedaceæ.*

8. *Ochradenus baccatus*, Delile, lower Sindé. I believe this to be the Egyptian plant, although the Sindé one differs in some trifling particulars; my specimens are not sufficiently advanced to show the spinifacient habit.

*Violaceæ.*

9. *Viola patrinii*, D. C.; Kurrachee, and Hala mountains.

*Reamuriaceæ.*

10. *Reamuria Hypericoides*, Wild. Doz Akhooshtee, and spurs of the Hala mountains.

The leaves of the Sindé plant are spatulate-linear and crowded to the ends of the branches.

*Sapindaceæ.*

11. *Dodonæa Burmanniana*, D. C. Lower Sindé. This shrub is not more than three feet in height, with leaves about an inch in length, never more, and blunt cuneate-linear. I have some doubt as to the species; there is another in Sindé of which I have no specimens.

*Malvaceæ.*

12. *Althæa pumila*, Vic: near Shikarpoor, plant herbaceous, from 6 to 10 inches.

Stems slender, stellately hairy, stipulæ ovate, leaves stellate, hairy on both sides, lower ones caudate at base, palmately 3 parted with the lateral lobes bifid, the apices roundly tridentate, midlobe cuneate, the apex roundly 3—5 toothed. Flowers very shortly pedicelled, axillary, blue. Involucre 10 cleft with linear lobes. Calyx half, 5 cleft, with acute lobes; anthers about 10; styles 10, filiform. Stigmata capitate. Carpels arranged round a central shortly 10 winged columella, the apex of which is filiform, not marginate, transversely corrugate, 1 seeded.

13. *Pavonia odorata*, Wild. between Kurrachee and Hyderabad.

14. *Serræa incana*, Cav.; sand hills, Kurrachee. This plant is rather pretty when in flower, it forms small bushes about two feet in height. Anthers 25 to 30, stipitate, veniform, 1 celled, stigmata ciliate.

15. *Abutilon Indicum*, Sindé and Hala mountains.

16. *Sida acuta*. Plains of Sindé.



*Tiliaceæ.*

17. *Antichorus* (*Corchorus*) *depressus*, Linn.; Khangurh and borders of desert.

18. *Grewia sapida*? all hilly places in Sindé. I have doubtfully referred this to *G. sapida*, but I suspect it is a very different plant, my specimens are not sufficient to determine; the petals bear a large scale at base and are bifid with toothed lobes. The berry is red and eatable when ripe.

*Portulacææ.*

19. *Orygia decumbens*, *Forsk*: eastern base of Hala mountains.

The sepals and petals are red, and the stems and leaves are often colored; this plant does not seem to differ much from *O. trianthemoides*, Heyne.

*Paronychiææ.*

20. *Cometes Surattensis*; all Sindé.

*Rutacææ.*

21. *Peganum Harmala*; all Sindé.

22. *Haplophyllum tuberculatum*, Andr. Juss: near Deyrah, Boogtee, Beloch hills.

*Zygophylleæ.*

23. *Tribulus alatus*, *Del*: eastern base of Hala mountains.

24. *Fagonia Mysorensis*; Sukkur and all Sindé.

25. *Zygophyllum obtusum*, *Vic.*; valleys of the eastern slopes of Hala range; plants gregarious, herbaceous, decumbent, pale green. Leaves fleshy, simple, spatulate-linear, blunt, or rounded at apex, sessile and subsessile, stipulæ acuminate, scales at base of stamens deeply bifid. Capsule deeply 5 wing-lobed, 5-celled, each cell opening inwards with 2—3 pendent seeds. Flowers short pedicelled, yellow.

26. *Seetzenia lanatum*, Wild.; all rocky places in Sindé. The stamens in the Sindé plant are most certainly alternate with the sepals of calyx, and not opposite to them; some doubt may exist with respect to the identity of this plant with that from Sierra Leone, I therefore give my note of it.

Plant spreading, semi-erect, stems and branches flexuose, woolly at the joints within the stipulæ, younger branches under surface of leaves, and their margins papillose from sessile glands, otherwise smooth, leaves petioled, opposite, 3 foliate, midleafet obovate, often retuse,

lateral leaflets oblique-ovate, all entire and shortly apiculate, stipulæ linear, often uniting with the margins of the stipulæ of the opposite leaf and thus appearing interpetiolar; flowers green tinged yellow, axillary, solitary, pedicels in fruit longer than the leaves. Calyx 5, parted with a valvate æstivation, lobes lanceolate, each bearing opposite its central base an adherent scale half its length and with free shortly fimbriate margins, stamens 5, hypogynous, opposite to the divisions of calyx, filaments slightly flattened, smooth, tapering, style 5-cleft almost to the base, with long linear terete lobes, stigmata capitate, rough, ovary oblong, 5-celled and ribbed. Ovula 5-pendent from the apex of columella. Capsule 5-furrowed and seeded, detaching from base into 5 cocci, and thus remaining for a long time pendent by short funiculi from the seeds to the apex of columella; the cocci are internally bivalved and perforated on the inner angles of apices for the passage of the funiculi. Columella persistent for a long time after the seeds have fallen, 5-angled, with the apex discoid, 5-lobed and with the placentæ in the sinuses between the lobes; seeds, brown, oblong, acute at both ends, with a scanty green arillus.

*Geraniaceæ.*

27. *Monsonia Asiatica*, *Vic.*: eastern base of Hala mountains and lower Sinde.

I believe that this is the first species of *Monsonia* found out of Africa. The Sinde plant belongs to the section "Holopetalum." Plant semi-erect, herbaceous, clothed everywhere with long, white, silky hairs; leaves long-petioled, cordate-ovate, blunt, irregularly dentate, 7-nerved, stipulæ herbaceous, linear-lanceolate; peduncles slender, 2—5 flowered, with from 4 to 6 unequal linear bracts at apex, pedicels slender, flowers blue. Calyx sepals apiculate, 3-nerved, petals entire, stamens pentadelphous in a double series. Capsule very longly rostrate.

*Rosaceæ—Sub-Ord. Neuradææ.*

28. *Neurada procumbens*, *Lin.*: borders of Sinde desert, at base of Hala mountains, and near Shahpoor. This curious plant has heretofore been noted as a native of Egypt, Numidia and Arabia.

*Leguminosæ.*

29. *Sophora tomentosa*, *Lin.*? At Coombe in the Boogtee Beloch hills, a shrub of 4 feet.

30. *Crotolaria arida*, *Royle*: borders of desert.

31. *Crotolaria oxalidifolia*, *Vic.* : eastern base of Hala range. Prostrate or semi-erect, with branches from 6 to 8 inches long, all parts clothed with appressed strigose hairs, stipulæ lance-linear, adnate; leaves petioled, 3 foliate, leaflets shortly petiololate, midleaflet obcordate, lateral leaflets oblique, obovate, blunt, peduncles slender, leaf opposed, legume sessile linear, trigone-hairy, 9-seeded and constricted between the seeds.

32. *Taverniera nummularia*, D. C. ; Hala mountains, near Deyrah.

33. *Alhagi maurorum*, *Tourn* ; Sindé passim.

34. *Cassia obovata*, *Collad.* Sindé passim ; this plant is also abundant in the Punjab.

35. *Adenantha pavoniana* ? Near villages, cultivated ?

Plants of this order are comparatively rare in Sindé ; my herbarium contains only four others, and two of these are *Indigoferæ*.

#### *Urticaceæ.*

36. *Forskalea ovata*, *Vic.* : Hala mountains. Plant rising erect to two feet, all parts clothed with sharp hooked hairs, leaves alternate, triple-nerved, white, tomentose beneath excepting the nerves, lower ones broad ovate, upper ones ovate, all narrowed at base into the petioles and grossly dentate; involucre of 4—7, linear spatulate lobes. This plant comes near *F. tenacissima*, and perhaps may be a broad-leaved, variety of it ?

#### *Aristolochiaceæ.*

37. *Aristolochia bracteata* ; Lower Sindé.

#### *Chenopodiaceæ.*

38. *Salsola Indica*. Sindé desert and Halas.

39. *Salsola stricta* ? Upper and Lower Sindé.

40. *Anabasis florida*, M. B. Borders of Sindé desert, and banks of Indus to near Bhawalpoor.

41. *Atriplex verruciferum*, M. B. ? Sand hills near Kurrachee. I have doubtfully referred this as above, but it is probably a new species. The whole plant is lepidate-hoary and shrubby. Leaves short petioled, oblong, ovate, and obovate, blunt, narrowed at base into the petioles, lower leaves often remotely toothed. Upper leaves entire, valves of fruit orbicular with reflexed entire margins, and subcordate bases, lepidate otherwise smooth. Stamens of the male flowers 5.

*Phytolaccaceæ.*

42. *Limeum obovatum*, *Vic.* : skirts of the Hala mountains near Kotree ; roots ligneous, descending deep into the soil, stems herbaceous prostrate, minutely pubescent. Leaves cuneate obovate, and ovate, obtuse with a point, minutely pubescent, flowers leaf opposed. 3—5 together, very shortly pedunculate, pedicels minutely bibracteolate. This plant comes near *L. Capense*.

*Polygonaceæ.*

43. *Calligonum polygonoides*? All Sinde. The specific characters of this curious genus are founded on peculiarities of the fruit ; unfortunately I have never seen the fruit of our Sinde shrub, and have merely referred it to *C. Polygonoides*, because that plant makes a nearer approach in habitat to Sinde than *C. Pallasia*. This shrub is common throughout Sinde, and is found on the banks of the Indus nearly as far up as Bhawulpoor ; near Shahpoor, at the eastern base of the Hala mountains, it is most abundant, forming small trees of 10 or 12 feet high, with a diameter of 6 to 10 inches at base ; when in full flower it looks rather pretty.

*Menispermaceæ.*

44. *Cocculus leceba*? *D. C.* ; lower Sinde.

*Myrsinaceæ.*

45. *Ægiceras fragrans*, *Kon* : mud flats Kurruchee harbour.

*Convolvulaceæ.*

46. *Ipomæa bilobata* ; sand hills, Kurrachee.

47. *Convolvulus lanuginosus*, *Desr.* : Hala mountains.

48. *Convolvulus parviflorus*, *Vahl.* ; base of mountains.

49. *Breweria evolvuloides*? *Chois.* ; Hala mountains. As I feel considerable uncertainty about this plant I add my note.

Shrub erect of 1—2 feet, stems slender ligneous, all parts densely clothed with a sericeous pubes. Leaves very shortly petioled, elliptic, upper ones lanceolate, entire, mucronate and emarginate from the reflexed mucro, triple-nerved, pubes more dense beneath. Flowers axillary, 1 to 3 together, subsessile. Calyx persistent, not enlarging, with 2 linear bracts at base, sepals, 3 exterior and 2 interior, a little shorter, lanceolate acute, hairy out. Corol with a deeply 5 lobed limb, the lobes hairy out. Stamens scarce exsert, filaments broad at base with 5 short teeth alternating, anthers reniform-cordate, ovary 2-celled,



ovulæ 4, styles 2, divergent, filiform, stigmata discoid orbicular, continuous (not peltate). Capsule chartaceous, dry hairy towards apex, longer than the dry calyx, 2-celled, sept membranous, 4 valved, seeds from 2 to 3, oblong, black, very minutely scrobiculate, of a nutty hardness.

50. *Evolvulus linifolius*, base of Halas.

51. *Cressa Cretica*, Var : *Indica* ; all Sindh.

*Scævola*æ.

52. *Scævola Taccada*, Roxb. tops of sand hills near Kurrachee.

*Plantagine*æ.

53. *Plantago amplexicaulis*, Cuv. Hala mountains.

*Plumbagine*æ.

54. *Ægialites obovata*, Vic. : sand hills, Kurrachee, shrub of 2 feet, stems ligneous, annulate with the ensheathing bases of fallen leaves, densely foliaceous upwards, leaves blunt cuneate-obovate, retuse, glaucous hoary, smooth, articulated to the sheaths at base, spikes paniculate, flexuose, terminal flowers secund, utriculus bursting at apex into 5 short acute teeth.

*Boragine*æ.

55. *Heliotropium Rotleri*. Kurrachee.

56. *Echium*? Hala Range. I am unable to refer this to any of the many described species, and therefore attach my note.

Plant fruticose, erect, about a foot in height, growing from fissures in rocks. Younger stems, leaves and calyces densely clothed with short appressed strigæ. Leaves 5—6 lines long, ligulate-linear, blunt pointed, sessile, alternate. Racemes simple, many flowered; flowers solitary, sessile, secund, bluish white, bracts like the leaves but smaller, bracteolæ none, pedicels short, adherent to rachis for half their length. Calyx with blunt linear unequal segments (sometimes only 4, the fourth broader); corol tube 10-nerved with a ring of hairs within at base, smooth in the middle and the fauces closed with hairs which indistinctly form 5 very small tubes between the anthers; lobes of limb patent, blunt ovate, slightly auricled at base (one lobe often broader). Margins minutely and remotely toothed. Stamens not exsert, filaments very short, anthers mutic, linear oblong blunt and undivided at base, style shortly exsert, its base becoming angular in seed; stigma peltate capitate with two minute central points, acheniæ rather smooth with

an incurved point, one or two, often only one maturing, attached to base of style, perforation at base oblong triangular.

57. *Trichodesma Indica*, Sinde passim.

58. *Trichodesma Africanum*, R. B.? Hala mountains.

I have referred this to the above with some doubt; it has the same prickly hispid habit, but differs in some particulars; plant growing from fissures in rocks, erect, 1 to  $1\frac{1}{2}$  feet. Leaves and stems dark green, hispid from hard white [prickle bearing calli, leaves opposite at the divisions of the racemes, otherwise alternate, upper leaves subsessile, lanceolate, acute, prickles longer on the margins and midrib beneath. Racemes lax, the lower ones from opposite axillæ upwards, from alternate axillæ and terminal; peduncles usually 3-flowered, lengthening with the enlarging calyx in seed: bracteolæ none; calyx rigid, hairy, 5-angled with rounded auriculæ, segments acute, corol blue with caudate lobes, stigma simple, blunt, pedicels lengthened with the much increased and nutant calyx in seed, acheniæ 4, subtrigonal; the outer faces concave, marginate, the margin acutely serrulate with slightly glochidate teeth.

My specimens do not exhibit the lower leaves.

#### *Labiatae.*

##### *Salvia.*

59. *Salvia Ægyptica*, *Linn.*: slopes of Hala mountains.

60. *Salvia pumila*, *Benth.*: slopes of Hala mountains.

61. *Salvia Halaensis*, *Vic.*: slopes of Hala mountains. Plant of 10—12 inches, erect, old stems ligneous, younger stems obsoletely 4-angled, densely clothed with short hairs, and sessile yellow glands,—leaves much corrugated, cordate-ovate, and broad ovate, blunt or rounded; slightly winging the short petioles, and often forming 2 lateral denticulæ at their apices; margins undulate lobate-crenate. Racemes 2—3 inches long, dense flowered subspicate; flowers blue, solitary, almost sessile; floral leaves small, bractea-formed, ovate, entire, hairy and longly ciliate, bracteolæ nearly as long as bracts; linear-lanceolate, hairy; calyx lanatopilose, enlarging and becoming nutant with the lengthening pedicel; upper lip shortly tridentate; the midtooth smaller, all acute, lower lip 2 part with linear filiform lobes. Corol, upper lip erect, short, bifid; midlobe of lower lip orbicular emarginate.

The acheniæ of this plant give out much mucilage in water.

*Verbenaceæ.*

62. *Verbena officinalis* ? Spurs of the Hala mountains, Lower Sinde. I have referred this doubtfully to *V. officinalis*. The foliage of my specimens is from the ends of the flowering branches. The leaves are petioled, opposite and alternate, both surfaces shortly pilose, ovate and broad-ovate, blunt or emarginate, 5-nerved, margin serrate with the three serratures at apex larger.

*Scrophularinæ.*

63. *Linaria sindensis*, *Vic.* : Base of Hala mountains, Upper and Lower Sinde. This plant is extremely like *L. triphylla*. Herbaceous, stems procumbent, or semi-erect, 8 to 10 inches ; leaves scattered, solitary, glaucous, entire, ovate narrowed into and winging the petioles ; apices soft-pointed ; young leaves often shortly pubescent ; flowers purple tinged, yellow, subsessile, axillary, solitary, bracteolæ none ; upper lobe of calyx foliaceous, broad-ovate, greatly exceeding the other 4 ; linear lanceolate lobes, lower stamens with their anthers united ; stigma simple ; capsule obliquely globular, 2-celled, upper cell abortive, lower cell many-seeded, bursting irregularly ; seeds conic. Testa spongy, furrowed.

*Linaria ramosissima*, *Wall.* : Hala mountains ; the Sinde plant is soft-ly pilose, in other respects it is the same.

*Anticharis*. *Endlich* : Hala mountains.

*A. Viscosa*, *Vic.* : This plant belongs most certainly to Endlicher's genus, and probably to the very species, but as I have no means of referring to the specific characters given, I have allowed my Herbarium name to stand for the present.

The Sinde plant is so viscous that everything adheres to it. Flowers blue, leaves ovate-lanceolate, narrowed into the short petioles : pedicels short, minutely bibracteolate above the middle seeds : truncate oblong, longitudinally grooved with minute transverse striæ.

*Solanaceæ.*

*Solanum Forskalii*, *Dun* : cordatum, *Fors* : Hala mountains ; both species appear to be different forms of the same plant ; our Sinde plant is sometimes prickly, sometime not, the leaves are variable also. Stems slender ; prickles both curved and straight, near the ends of the branches only ; young shoots and leaves starry pubescent, old leaves smooth, round-cordate or subcordate at base, narrowed into the petioles ; mar-

gin entire or occasionally sinuate toothed flowers rather longly pedicelled, blue; the corol greatly exceeding the half 5 cleft calyx; berry red, smooth rather, larger than a pea.

*Physalis somnifera*, var *flexuosa*, all Sind, and Hala mountains.

*Hyocyamus muticus*, *Lin.* Hala mountains.

#### *Apocynæ.*

*Rhazya stricta*, *Decaisne.* This shrub is abundant in the Hala mountains, and at their eastern bases, but particularly at Shahpoor. It usually grows upon sandhills, and has somewhat the habit of our garden Oleander, but does not rise to more than three feet. The flowers are pale blue turning white by age. There is a small entire margined nectarium.

#### *Asclepiadeæ.*

*Periploca aphylla*, *Dec.* *Bot. Jacq.* All hilly parts of Sind.

This is my friend Dr. Falconer's *Campelepis*. *Ann. Nat. Hist.* Vol. X. page 362. This shrub abounds in the Boogtee Beloch hills near Deyrah.

The habit is that of *Orthanthera Viminea*; the branches are devoid of all pubes. The leaves are linear lanceolate (not ovate,) and are seen only on the young surculi. The flowers are of a dark dull red colour; the long uncinat filiform processes of the faucial corona, are inflected over the genitalia in the earlier stages of the flower, but subsequently become reflexed through the divisions of the corol. The pollen of this plant requires to be re-examined in the fresh flowers; in my opinion it not only differs from that of *Periploca*, but from the pollen of every genus of the order.

*Orthanthera Viminea.* All Sind.

With few exceptions the above noted plants are foreign to our Indian Flora, flourishing between the parallels 25° and 30° N. Lat. or nearly equivalent to the tract between Allahabad and Hurdwar. At first sight it appears strange that so many northern forms should exist in Sind in excess of those found between the same parallels in India, but a slight examination of the countries forming our northern frontier will I think sufficiently account for it. The Himalaya mountains, the Hindoo Coosh, and probably the Tukt-i-Sulleemaun range, form an impassable barrier to certain classes of plants, but the lower ranges of the Hala mountains, which in many places are not more than 1,500 feet above the sea, offer no such obstacle; besides this there is the coast line, which with its constantly drifting sands offers a facile mode of trans-



mission to seeds; thus we find several Egyptian, Arabian, Persian and African plants in Sinde; that they have not spread into India seems also easily accounted for. The Indian desert of Jesulmeer proves in a south eastern direction a sufficient preventative. The course viâ the banks of the Indus is to a narrow extent only open to the north-east, and accordingly we find some Egyptian forms extending to Delhi and its neighbourhood, as has been remarked by my friend Doctor Royle in his illustrations of Indian Botany, p. 70, and p. 160.

*Salvadora persica*, *Capparis aphylla* and *Farsetia*, are found throughout Sinde; however *Giseckia* so abundant near Ferozepoor, is not found in Lower Sinde; *Orobanche Calotropidis*, *Edgw* : is found from Umballa to Kurrachee, and is extremely abundant in Lower Sinde; the flowers of this plant are changeable, being blue at first and becoming pale yellow, hence two varieties have been supposed to exist. No scitameneous or orchideous plant exists in Sinde; of the latter order *Zeuxine* is sparingly found under the Tamarisks, nearly as far as Subzulkote, following the course of the river.

The coast line alluded to above offers no obstacle to the diffusion of plants in a southerly direction viâ Cutch and Goozerat towards Bombay, but as yet these countries, the Delta of the Indus and the south-western tail of the desert are botanically unknown; in the other direction a botanical excursion to Sonmeeanee Bay or farther if possible, would serve to connect our Indian flora with that of Africa, Persia and Arabia.

I have still some curious Sinde plants of which I hope to give an account hereafter.

*Subathoo, 27th September, 1847.*

*Reply to the Minute by Capt. MUNRO, regarding the MS. of the  
"Burnes drawings."—By E. BLYTH, Esq.*

*To the Secretaries of the Asiatic Society.*

GENTLEMEN,—As it has been deemed expedient to publish in the 'Proceedings of the Society' the minute by Capt. W. Munro, reflecting (as I cannot but think) with very undue severity on the mode in which I have prepared the descriptive letter-press to illustrate the lithographed drawings of the late Sir A. Burnes, I must now request that you will permit me to be heard in reply, and that you will favor me by awarding the same publicity to this letter as has been granted to the aspersions in question.

In the first place, I know nothing of any remuneration that was ever promised me for executing the task that was assigned to me; the sum of Co.'s Rs. 3,200 which I have since received from the Society, was for arrears of an additional hundred per month of salary, withheld until I had completed the said letter-press, as some inducement for me to undertake a labour for which it was believed I had no particular liking. It was well known that I had strenuously and consistently opposed, from the first, *and considerably to my own disadvantage*, any outlay of money upon the publication of what I have always regarded and repeatedly averred to be a series of drawings *possessing not the slightest scientific value*; but on this subject I need merely refer to my letter published in the Society's 'Proceedings' for October 1845, and here repeat my regret (for which I have now a further pecuniary reason) that, as the recognised zoological officer of the Society, it was not deemed necessary to consult me in a single instance about even the selection of the drawings for publication, whence some of the very worst are amongst those upon which the expense of lithography has been incurred, the worst alike for execution, for representing the most familiarly known European species, and *in several instances* different drawings representing the same species! I conceive that I should have been greatly remiss in my duty to the Society if I had not uniformly endeavoured to oppose so wasteful an expenditure of money, as the enormous outlay upon these "trashy" drawings is now admitted, on all hands, to have been: but, gentlemen, I wish it to be recorded, that instead of having benefited to the extent of Co.'s Rs. 3,200 for preparing the letter-press to accompany the publication of those drawings, as would be inferred from perusal of Capt. Munro's minute, the small increase of pay that had been allowed me for nearly three years previously was withdrawn, not in consequence of any dissatisfaction felt towards myself, but because of the impoverishment of the Society *resulting from the outlay of which I was so long the sole opponent, as I am now the only personal sufferer from the retrenchment!*

Capt. Munro expected that I should have "zealously undertaken an essay on the animals of Afghanistan and neighbouring countries"—"considering a large and distinct remuneration" was expected. Of the latter I need say no more: and as regards the former, Capt. M. happened to be unaware that I had such an essay in a forward state of preparation, the ornithological portion of which had long since been sent in; but that it had been suggested by the Senior Secretary of the Society that nothing of the kind was required, and that it would be sufficient if I simply identified the species, as far as was practicable.\*

\* This suggestion was only made in March, 1847, when I found the Society unanimous in their resolution not to publish the plates.—W. B. O'S., *Sen. Secy.*

Of my execution of this labour, Capt. M. remarks—"All that seems to have been done consists in guessing at the names of a number of animals, intended to be represented, in a series of bad drawings, with scarcely any original information regarding these animals. The little that has been done has been but slovenly executed," &c. Really I cannot imagine what else could have been done, or expected, under the circumstances; having, in the great majority of cases, no further data than the said "bad drawings" to build an opinion upon,—to "guess" at as I best might. Neither do I see much advantage in amplifying the notices of common and well known species, merely for the sake of filling out the page; nor even in imparting valuable information about rare species in a work which, as I had every reason to infer, was destined to be all but suppressed. Unhappily, the MS. notes of Dr. Lord, which would have afforded some assistance, had unaccountably disappeared from the Society's Rooms:\* and the specimens collected by the party were few and mostly valueless.

The most useful to me amongst the latter were some of the fishes procured; and without these it would have been impossible to determine certain of the species with anything like precision. Whoever reads Capt. Munro's brief paragraph on this class will assuredly do me the injustice to infer that I am indebted to my friend Mr. McClelland "for the short notes attached to this portion of the drawings" (the *Afghan* fishes? or the fishes generally? vide minute): the fact, however, being that my attempts to ascertain the numerous species figured, from very insufficient data in most instances, cost me much tedious labour; and but a small residue of them remained for determination when I consulted Mr. McClelland on the subject. That gentleman very obligingly rendered me all the assistance in his power, and I trust that I have sufficiently acknowledged the aid which I derived from him; and moreover that I am not exactly to blame for obtaining assistance from every available quarter.

So with the reptiles. Very truly—"The names of the snakes have been guessed at in a most haphazard way." For the simple reason that there was no alternative in the matter. Not having a single book treating on the *Ophidia* in the Society's library, except Russell's '*Indian Serpents*,' the

\* Although nominally under my charge, they were virtually in the same keeping as the other books in the Society's library; and thither I returned them as often as I had had recourse to them, and on no occasion took them out of the premises. I could have had no reason for ever doing so, as my custom has always been to work solely at the Museum: but why so unpretending a small volume of MS. should have been abstracted from the place, in preference to others of bazar value, I own to some difficulty of understanding.



nomenclature of which is now antiquated, I consulted a gentleman well known for his attainments in this branch of Zoology, in the presence, too (as it happened), of another eminent naturalist, W. H. Benson, Esq.; and may remark that the name *Acrochordus*, with a mark of doubt, was not of my suggestion; nor that pl. XLII, fig. 2, represented the young of pl. XLI, fig. 1, though I still entertain the opinion that it does so. The supposed *Dipsas* I so assigned, with a note of interrogation however, from its general resemblance to the common *D. trigonatus*, combined with the fact of the head being expanded as usual in this genus: but where figures are admitted to be "bad enough to favor any guess," a less harsh tone of criticism might, I think, have been advantageously adopted, and even a private suggestion or two might have been offered and thankfully responded to, as a preferable mode of promoting the interests and the harmony of the Society.\*

The birds treated of are numerous, and I believe are all correctly assigned; but unfortunately I made the one sad oversight of writing *Grus cinerea*, Lin., instead of *Grus cinerea*, Bechstein; an error which I could scarcely have failed to rectify when correcting the press, and which assuredly is made the most of by Capt. Munro, by the mode in which he has notified it. He says—"Grus was not a genus, nor *Ardea cinerea* a species, of Linnæus." I think, however, he will find that the latter is a particularly well known species so named by Linnæus, though not referring to the *Grus*; which name seems to have been first used in a generic sense by Mœhring. Again, I need scarcely say I knew well that *Capra ægagrus* was Gmelin's species, and

\* I quote here all that I deemed it necessary to write of the four snakes particularly referred to by Capt. Munro, who, after complaining of my guessing what they were, proceeds to offer a few guesses himself!

"Pl. XLI, fig. 1. *Acrochordus*? *Bamoo-ee*, or *Dwo-moo-ee*. It is not possible to determine what this snake is, without a knowledge of the actual species. Perhaps it may be a large *Typhlops*.

"Pl. XLII, fig. 2. *Acrochordus*? This is probably the young of the species represented in pl. XLI, fig. 1. The originals of both figures were procured at Issakhai.

"Pl. XLIII, *Dipsas*? *Tropidonotus*? It is not possible to determine what this is meant for, without a specimen for reference. It is probably a *Dipsas*? Procured in the Derajat.

"Pl. XLIV, fig. 2. *Dipsas*? *Alteran-nag*, or *Gorah-dang*. Probably the young of the species figured in Pl. XLIII. This and the next were procured at Buhawalpore."

Surely it is much better to express doubt in such cases than to pronounce dogmatically? Of myself, I would not have undertaken what I consider such useless labour, as to attempt to determine species so wretchedly represented, the scutation, for instance, being expressed by simple cross-lines.



not Pallas's; and I venture confidently to assert that I should (in all probability) have corrected this inadvertence as well as the other. It is my general practice to look carefully over all matters of this kind when I receive the printed proofs for revisal; and I do not think that trivial errors of the sort are very often to be met with in my published papers. Indeed, with species so familiarly known as the above two are, it is a mere matter of form to cite the name of the author of the nomenclature; and I maintain that it is *most unfair*, on the part of Capt. Munro, to argue that the laboured part of the MS. was carelessly executed, because notices of such species as the common European Crane were written out of hand, and I chanced to say "*Grus cinerea*, Lin.;" the identification of the bird remaining, of course, unaffected.

Capt. Munro himself commits a little oversight of the kind, when he says—"The name of pl. II, fig. 3, can at best be but a guess," &c. &c. He alludes to pl. III, fig. 3, (this, however, may be a misprint :) but there is more serious reason to complain of his mistaken surmise about the *guess-work*, when, if he had taken the trouble to read what I had written on the subject, he would have found the words—"Identified from a skull, with the skin and fur on, among the specimens transmitted to Calcutta by Sir A. Burnes:”—there being, besides, another and perfect skin belonging to Capt. Hutton in my possession at the time I wrote this, and which I have by me to this day. I am entitled, therefore, to retort that Capt. Munro's minute is carelessly and hastily written, or he would not have made such a misrepresentation.

"Pl. IV, fig. 2," he says, "has no trouble taken with it, although it is supposed to be a new species." This is another mistaken surmise, on the part of Capt. Munro. I gave the subject full consideration: and having satisfied myself that the *ensemble* of its characters accorded with those of no described species of *Mustela*, I deemed it sufficient to say—"This species should be distinguished by the uniform whiteness of its under-parts and limbs, and rather lengthened tail having no black at the extremity;" which, with the coloured figure before the reader, marked "*Mooshkoormah*, nat. size one foot long," is, I still think, amply sufficient. I should be sorry, however, to found a name upon such a figure, and merely marked it thus—" *Mustela*—?"

Respecting the *Moosh-i-baldar* of Nijrow, plates VI and VII, I beg leave to retain the opinion I expressed, that it is *probably* a new species (vide also Journal for August last, p. 866). I think it probable that I have seen more specimens of *Sciuropterus fimbriatus* than my friend and old correspondent Prof. Schinz of Zurich, whose recently published work on the mammalia, referred to by Capt. Munro, is not in the Society's library, nor was there a copy of it in Calcutta at the time I wrote the notice referred to. It would therefore have been more friendly, on the part of Capt. M., to have called

my attention to M. Schinz's description of *Sc. fimbriatus*; and it would surely have been more satisfactory to himself to have examined the specimens of this animal in the Society's Museum, and to have personally compared them with Burnes's figure of the *Moosh-i-baldar*, than to have resorted to any mere description whatever.

Had Capt. M. also done me the honour to have looked over my tolerably large collection of carefully executed original drawings of wild Goat and Ibex heads, embracing every species known, except *C. caucasica*,\* *C. sibirica*, and *C. pyrenaica*, (of which two latter also I could have shown him M. Schinz's published figures, that gentleman having favored me with a copy of his memoir on these animals, and at the same time—1840-1—received from me his first intimation, with tracings of my drawings of the horns, &c., of the existence of the Himalayan Ibex, and I believe the Afghan Markhore, with different wild Sheep,) he would have given me credit for being a little more conversant with the group—in common with the other groups of *Ruminantia*—than he seems to be aware of. I have indeed bestowed much attention upon the different species of wild *Capra*: and on reperusing what I have written respecting the *Booz-i-koh*, am still of opinion that it more resembles the *C. himalayana*, nobis, apud Schinz† (vel *C. sakeen*, nobis), of the N.W. Himalaya, as where the Indus breaks through the chain, &c. &c., represented in *summer dress*, than any other known species. *Ægagrus* it cannot be, for the horns are knobbed as in *C. ibex*; and it certainly is not *C. sibirica*; and I further adhere to what I wrote of *C. sakeen*, that—"This differs from the Alpine Ibex in possessing a well developed beard: the horns also attain a greater length than in that species, and, in general, attenuate much more towards their tips, being also less widely divergent; as fully described in the 'Proceedings of the Zoological Society' for 1840, p. 80, where the dimensions are given of a pair measuring  $4\frac{1}{4}$  ft. over the curvature.‡ A corresponding difference is observable in the horns of the females of these two Ibices," &c. &c. Having said this much, I believe I have pointed out all the differences that exist between the Alpine and Himalayan Ibices; and I deem it unnecessary to enumerate the characters that are

\* I have drawings of the horns referred to *C. caucasica* by Mr. Gray, in his 'Catalogue of the specimens of mammalia in the British Museum:' but I consider these to belong, decidedly, to *C. ægagrus*; and suspect that those of *C. caucasica* will prove to be allied in form to those of *C. walie*, Ruppell, of the snowy heights of Abyssinia.

† I have no recollection of employing this name for the animal, but might have done so in the course of my correspondence with Prof. Schinz, at a time when I had no idea of visiting India.

‡ The description referred to was by myself, and I have now two drawings of the specimen in different aspects of view.

common to both, which any good description of *C. ibex* will supply : as in the particulars in which other species differ from the one, they will also differ from the other,—the horns and beard of course excepted, being the only known discrepancies between the two.\* Capt. Munro's remark that the drawing I suggested to represent the female of *C. megaceros*, Hutton (v. *Falconeri*), from comparison of it with Capt. Hutton's description of that animal, should (as its native name implies) be considered rather as the female of the Ibex figured, I willingly bow to as a just piece of criticism, in contrast, I am sorry to think, with all the rest.

From the whole tone of this minute, it is perfectly clear that Capt. M. laboured under the erroneous impression that a large sum had been promised to me for the performance of a certain task, and that I had not given the Society the worth of their money ; and this it seems to be his object to show

\* In *C. ibex* the beard is constantly reduced to a mere rudiment, that must be looked for to be observed (much as in Ruppell's figure of *C. walie*) ; while in *C. sakeen* it forms a large and conspicuous tuft, as in *C. agagrus*, *C. jaëla*, and others. In *Proc. Zool. Soc., loc. cit., supra*, it is mentioned that the Himalayan Ibex is very closely allied to the Swiss one, having a similar rudimental beard, and colouring, so far as I could learn : and acting upon the information supplied to me, in both cases, I mentioned in a letter to the Secretary of the Zoological Society, written on board ship, and published in their 'Proceedings' for Aug. 10, 1841, that the Nilgherry Ibex had "a considerable beard, in which character" (misprinted *characters*) "it differs from the Himalayan Ibex." This passage Capt. Munro has cited. Further, in corroboration of the statement of my fellow passenger Lieut. Beagin, I find that Dr. Baikie, in his 'Observations on the Nilgherries,' p. 45, after describing a specimen of the female of the so called Nilgherry Ibex, adds—"The male at a distance appears at least six inches taller, nearly black, with very large knotted horns, and a long black or brown beard," &c. &c.—On the other hand, Mr. Jerdon assures me that the so called Ibex of the Nilgherries is no other than the *Kemas hylocrius*, Ogilby, or *Capra warryatoo* of Gray (vide *J. A. S.* XII, 181, *bis*) ; which animal I believe to be erroneously assigned by Mr. Gray to Nepal, as formerly to Chittagong, and that it is quite peculiar to the Nilgherries. It is not an Ibex, but akin to the *Tehr* (or *Jharal*) and to the *Goral* of the Himalaya. In these animals, the horns are not elongated as in the true wild goats, nor have they any trace of beard on the chin ; and they are very remarkable for possessing four developed teats, whereas all the nearly allied animals have but two. (I do not consider *Nemorhædus* as being nearly allied to them). As for the Himalayan Ibex, I find from examination of specimens, that I was erroneously informed respecting the non-development of its beard. In the head of a young male, belonging to Major Broome, now in the Museum, this measures 4 inches in length.—P. S. In a letter just opportunely received from Mr. Jerdon, that naturalist remarks—"Of course there is no such animal as Baikie's [Nilgherry] Ibex with knotted horns and a beard ; though I have heard some sportsmen speak of a beard, yet not one was ever produced that had one."



very unsparingly. The Society is, of course, right in expecting the highest amount of qualification from its scientific officers : but it is for the members of the Society to consider what they give in return for such proficiency, and what advantages their Museum and Library afford for *isolated study*, unaided as in Europe by the friendly intercourse of numerous fellow students of the same subject, who mutually impart much valuable information one to another, and by the great facilities afforded otherwise in various ways.\* It is for them also to consider how much discouragement is involved in the *slight* offered to an officer from whom so much is expected, by allowing him no voice whatever in advising the Society respecting the selection of plates for publication, which he is called upon to illustrate ; though by regarding which, they might at least have chosen the better of two drawings of the same species for publication, instead of going to the expense of lithographing both, and have avoided that expense in numerous other cases where the commonest European species were badly figured. There are few, I think, but will allow that I have little cause to be satisfied with any part of my connexion with this unfortunate publication, now so decried, though formerly so highly eulogized ; and the minute which I have now essayed to reply to is a fitting conclusion to the former history of all that relates to myself in connexion with the undertaking. In affording me, however, a plea and an occasion to express my sentiments freely, in this matter, I have perhaps no reason to be dissatisfied that it has appeared in the Journal. While confined to a private circulation among the members of the Society, I thought it preferable to remain silent, and spend my time more profitably to the Society than in controversy of any kind ; but now that it has gone forth to Europe and the world, in the pages of the Journal, it becomes incumbent on me to have a due respect for my own reputation, by meeting the charges made against me, as I trust to the satisfaction of the Society. An opposite course would imply my acknowledgment of the justice of the criticism.

I have the honour to be,

Gentlemen,

Your's very obediently,

E. BLYTH.

*Asiatic Society's Rooms, Sept. 11th, 1847.*

\* For example, how much precious time is here lost in the determination of genera and species, which, with collateral information on the superior groups to which they belong, may be learned at a glance at the specimens in any well arranged museum of adequate extent, where each branch of Zoology (for instance) has its own particular superintendent.



*Report of Curator, Zoological Department, for September 1847.*

The following specimens have been received since the last meeting of the Society.

1. From Lieut. Strachey, 66th N. I. A package containing three skins of Tibetan animals, that had been long overdue, having been lying for some months in the premises of a mercantile firm in Calcutta. Under such circumstances, it is rare that skins of animals escape becoming utterly ruined by insects; but the present instance affords an exception to this very general rule, as the specimens are as free from injury as when they were packed. They are as follow:—

An imperfect skin of a blackish or *melanoid* variety of the Tibetan Wolf, designated *Lupus laniger* by Mr. Hodgson. Together with it, and in illustration, I exhibit an equally black Jackal, presented to the Society some time ago by W. Seton Carr, Esq.; and we have another common Jackal of a light rufous sandy colour, which variety is not very rare in the neighbourhood of Calcutta, upon the opposite side of the river only. The dark Wolf-skin has the head imperfect, and is mutilated of the paws and brush; but the muzzle and ears are present, sufficing to remove any doubt that might have arisen otherwise respecting the identification of the skin as that of a Wolf. It is a particularly beautiful specimen, or would have been so if perfect. The melanism consists in the much greater admixture of black than usual in the fur, giving the predominant tone of colour; the whitish being most apparent on the sides of the body. The ears are wholly black; the face and limbs chiefly so, or suffused throughout with fuscous, having a few whitish hairs intermixed; and there is a conspicuous ridge of lengthened black hair along the spine, much developed posterior to the shoulders,—the same hair as is found in all other Wolves, but appearing in them whitish with black tips only. A corresponding dark variety of the European Wolf was denominated *Canis lycaon* by Linnæus: and such variation of colour is less unusual in the Wolves of Arctic America.

For comparison, I also exhibit three fine stuffed specimens of Tibetan Wolves in their normal colouring, and a particularly fine stuffed specimen of a European Wolf, from Norway. An Indian Wolf I have never yet been fortunate enough to procure for the Society, though so common on the plains of Hindustan. According to Mr. Hodgson, the Tibetan race “has the general form of the European Wolf; but its colour is very different, and it has more elevated brows, larger ears, and a much fuller brush. Its pelage is also dissimilar and unique.” On comparison of the Society’s specimens, it will be seen that the brush of the European Wolf is fully as fine as (if not

finer than) that of either of the three Tibetan specimens; and the ears measure the same: but the Tibetan is a much slighter animal than the European Wolf, with considerably smaller paws. Its pelage is finer and softer, rather longer, but certainly not more dense and woolly next the skin; and the general tone of colour is much paler, this arising, however, in a great measure, from the considerable diminution of the number of black-tipped hairs on the sides (in most specimens), and their total absence—or nearly so—on the limbs; the distinct black streak in front of the fore-limbs of the European Wolf, as of the Jackal, being but very slightly indicated in the majority of individuals of the Tibetan Wolf, and in some specimens not at all. European Wolves vary a good deal, in some being much more fulvescent than others, or having the black tips and markings more developed: and the same variation occurs in the Tibetan race; the fulvous of the European Wolf being replaced by a delicate light isabelline, or rufous cream-colour, which prevails on the neck, upper-half of limbs, shoulders, and saddle (where mixed with the usual long black-tipped hairs); and the ears of some are conspicuously bright light rufous, while in others this colour is paler, and more or less mixed with black, as in European specimens. The pale colour of the Tibetan Wolf is in conformity with that of many other animals of the same region, as the Foxes, Bear, Ounce, Lynx, &c., and the Leopard when inhabiting near the snows. Comparing the skull of a European Wolf with four skulls of Tibetan Wolves (presented by G. T. Lushington, Esq., IV, 56), the most marked difference consists in the superior development and elevation of the super-orbital process in the latter; the muzzle, too, is somewhat broader in the European, and its teeth are decidedly larger and more robust;\* the *ensemble* is sufficiently different to enable one who has examined them together to pronounce, I think, with confidence in which of these regions a Wolf-skull had been procured; but individuals of each race differ to that extent that we should not be too hasty in assuming any particular distinction as absolute and invariable. Specimens of Wolves from other parts of middle and northern Asia require to be extensively compared, ere the vexed question of specific differences or identity can be determined with so much as an approximation to probability. Nevertheless, the analogy afforded by the adjudged distinctness of the Bear, Ounce, and Lynx, of Tibet—not to mention other instances, is in favor of the Wolf also being a peculiar species, though distinguished in a less marked manner from its nearest affines. For the present, however, I think we can only venture to regard it as *Canis lupus*, var. *laniger*, (Hodgson.)

\* I observe remarkable difference, however, in this respect, between the different Tibetan Wolf skulls.

*Felis uncia*, Lin. A flat skin, perfect, with the unfortunate exception of the four paws, of which it is mutilated. Another and finer Ounce skin was some time ago sent us by Mr. Lushington, similarly imperfect.

*F. isabellina*, nobis, *n. s.* The Lynx of Tibet. An imperfect skin, which I exhibit together with three other specimens of Lynxes from Tibet, and with three from Norway,—the latter being of the species referred to *F. lynx*, L., by M. Temminck, and which is termed *F. virgata* by M. Nilsson. The difference of colour of the Tibetan from the ordinary European Lynx is much the same as with the Wolves of the two regions: the Tibetan animal exhibiting a deficiency of colour; and the markings also are much less brought out, in the summer pelage, than I have seen in specimens of the ordinary European Lynx. A distinction, however, which I cannot help regarding as specific exists in the very much larger naked pads of the feet and toes, at all seasons, in the Tibetan as compared with the European Lynx; in the latter those of the toes are even discovered with difficulty, amid the very long fur that completely conceals them; whereas in the Tibetan species these pads are large and prominent, and the fur between them is short and close, and does not conceal them at all. In other respects, the two animals bear much resemblance, except that (so far as can be judged from skins only) the Tibetan would seem to be a taller and more slender species. The ears and tail are shaped and coloured as in the other; but the ear-tufts of the Tibetan Lynx would seem to be always more developed, measuring 2 inches and upwards in length. The fur varies much, according to season. In one specimen before me, in full summer dress, the pelage is short, and of an uniform dull sandy-brown colour, deeper and more rufous along the back, where grizzled with whitish-tipped and also some black-tipped hairs, which on the sides are diffused more scantily: the lower-parts are white, with (as usual) some scattered dusky spots; and there are some not very conspicuous markings of a deeper hue outside of the limbs: face and *mouchetures* as in the European Lynx. Another and mounted specimen is much paler, a light isabelline hue predominating; and at a proper distance and angle of vision, the Ocelot-like markings of the European Lynx in summer may just be made out upon the sides of the croup, and the spots on the limbs and sides of the body are comparatively distinct; the blackish bars on the inside of the fore-limbs being well developed. The winter dress is of a nearly uniform fine rufous cream-colour, or isabelline, below the surface, but showing more or less; the hairs whitish-tipped with black at the extreme tips, producing a somewhat grizzled appearance; the isabelline hue underneath being much less deep than in the European Lynx, in which the colour is rather a full rich orange-brown: sides paler and longer-haired, as usual, and the colour purer, passing to white underneath, intermixed with black hairs that grow



on the spots, but which latter have hardly that appearance. For several specimens of this animal, those of the Wolf, and of various other Tibetan mammalia, the Society is indebted to the repeated contributions of G. T. Lushington, Esq., of Almorah.

2. Mr. E. Lindstedt. A selection of bird-skins procured in the neighbourhood of Malacca. Among them is a fine specimen of *Cuculus sparveroides*, which I had never before seen from that part,—also beautiful specimens of *Hemicercus javensis*, *Campephilus validus*, *Tiga Rafflesii*, *Gecinus mulaccensis*, *G. (?) rubiginosus*, *Sasia abnormis*, *Tchitreia affinis*, *Eupetes macrocercus*, *Lanius tigrinus*, *L. superciliosus*, *Enicurus frontalis*, *Orthotomus edela*, &c.; with a newly hatched specimen, in spirit, of *Python reticulatus*, (Schneider). The *Gecinus (?) rubiginosus* (Eyton, v. *Picus melanogaster*, A. Hay), is, I may remark, allied in structure and colouring to *G. (?) pyrrhotis*, (Hodgson,) and with it might form a distinct named subdivision. The Malayan specimens which I have hitherto referred to *Lanius phænicurus* (v. *melanotis*, &c.), I now believe to be females or imperfectly mature males of *L. superciliosus*; and though quite undistinguishable from *L. phænicurus* of India, the latter nevertheless does not ever assume the broad white forehead continuous with the eye-streak, nor the uniform rufous of the upper-parts, characteristic of the adult male *L. superciliosus*. Lastly, respecting *Tchitreia affinis*, A. Hay, XV, 292, I may notice that subsequent observation of numerous specimens has fully confirmed the propriety of separating this bird from *Tch. paradisi*: I have traced it from Sikim to Arracan, the Tenasserim provinces, and Malayan peninsula; but without the local variation which I formerly indicated (p. 473 ante), as Malayan specimens have sometimes all the tail-feathers conspicuously black-edged throughout their length, while others have scarcely more of this black edge than in *Tch. paradisi*. The inferior size, and the much shorter and different-looking crest, afford invariable distinctions, however, by which *Tch. affinis* may be recognized apart from *Tch. paradisi*. One of Mr. Lindstedt's specimens of the former species, in the white plumage, differs from all others I have seen of either species, in having the next pair of tail-feathers to the middle pair considerably lengthened, measuring 7 inches, while the middle pair are  $14\frac{1}{2}$  inches.

A Malacca collection lately received by Mr. Frith comprises the following species of birds, which I take the present opportunity of noticing. *Spizaetus nipalensis*, (Hodgson,) of Bengal, in the wholly black plumage; distinguished by its superior size and merely rudimentary top-knot from the nearly allied, but distinct, *Sp. caligatus*, (Raffles,) of Malacca;—and *Bulaca indrani*, (Sykes,) of India: neither of which species I had previously seen from the Malayan



peninsula; where the beautiful *B. seloputa*, (Horsf., v. *pagodarum*, Tem.), was procured by Dr. Cantor. The following Kingfisher is new.

*Alcedo nigricans*, nobis. This approaches *A. grandis*, nobis, in size, having the wing  $3\frac{3}{8}$  in., and bill from gape  $2\frac{3}{8}$  in. Colour much as in the allied species, as *A. ispida*, &c.; but the blue reduced to a few not very bright spots upon the crown and wings only, upon a fuscous ground; the scapularies being wholly fuscous, without a tinge of blue or green: but the middle of the back and rump are bright verditer, as usual; and the upper tail-coverts incline to indigo: loreal spot, patch on side of neck, breast, flanks, and lower tail-coverts, deep ferruginous; the throat, front of neck, and middle of belly, rufescent-white: ear-coverts dull rufous, each feather tipped with dingy blue; and the moustaches fuscous, similarly tipped with dingy blue. Upper mandible black, and the lower coral-red, in the specimen.\*

*Batrachostomus affinis*, nobis, n. s. Very similar to *B. javensis*, in the plumage figured by Dr. Horsfield (and which is considered to be the young dress of *Podargus auritus*, Tem.),† but smaller, with no white spots on the wing, nor pale spot-like bands on the tertiaries and caudal feathers; but the former are uniformly freckled over with dusky specks, and the latter present a series of obscure freckled bands, seen best at a little distance: throat and breast plain rufous, with a few white feathers having a subterminal dusky border on the fore-neck and sides of the breast only. Rest as in *B. javensis*, juv. Length about 9 in., of wing  $4\frac{1}{2}$  in., and middle tail-feathers the same. This is the small Malayan species which I formerly considered might be

\* I have now before me the following Asiatic species of restricted *Alcedo*.

1. *A. grandis*, nobis. Wing  $3\frac{3}{8}$  in.; bill to forehead 2 in. Like *A. ispida*, but the coronal spots of a paler and different blue, and no rufous on the ear-coverts. From Darjeeling.

2. *A. nigricans*, nobis. Malacca.

3. *A. ispida*, Lin. Afghanistan.

4. *A. bengalensis*, Gm. India generally, Malayan peninsula.

5. *A. moluccensis*, nobis. Ear-coverts dark blue, and bill much deeper than in the last; the blue of the upper-parts very splendid, and of quite a different tint from that of either of the other species.

6. *A. meninting*, Horsfield: *A. asiatica*, Swainson. Malacca, Java.

7. *A. biru*, Horsfield. Java.

Among all these species, the nearest approximation exists in the case of *A. ispida* and *A. bengalensis*, which differ only in *A. ispida* being rather larger. The rest are well distinguished one from another.

† A specimen in the *auritus* plumage, from Java, was presented to the Society by that of Batavia; and we have one in the dress figured by Dr. Horsfield, from the Malayan Peninsula, presented by F. Russell, Esq.

*Podargus stellatus*, Gould, P. Z. S. 1837, p. 43 : but it does not accord with the description of that species, and its dimensions are rather superior.

*Todirhamphus varius*, (Eyton,) XV, 11. The young of this beautiful species have the mantle and wings dark green, with a terminal pale fulvous spot on each feather, imparting a pretty speckled appearance.

3. From Major Jenkins, Gowhatti. Some skins of *Anatideæ*.
4. Mrs. Ashburner. A pair of living *Anser cygnoides*, from China.
5. Mr. J. R. Bell. A fresh head of the *Jamnapátri* Goat, with ears 17 in. long, when fresh.
6. J. Maxton, Esq., Police Surgeon. A fresh-laid egg of the *Grus anti-gone*. This was unfortunately pilfered by a Monkey, who had broken loose, but not before I had taken a coloured figure and description of it. Length  $3\frac{3}{4}$  in. by  $2\frac{3}{4}$  in. where broadest; the small end narrowing considerably. Colour pale greyish-blue, scantily sprinkled over with specks and small blotches of rufous-brown, more numerous at the large end.
7. James Hume, Esq. The skin and skeleton of a *Python molurus*, L., 14 ft. in length, killed on the reed-covered alluvial island formed near the right bank of the Hooghly, nearly opposite to Fort William.
8. Dr. Thorburn, Goalpara. A collection of sundries.
9. Mr. Birch, of the Pilot Service. A living young example of *Viverricula malaccensis*, and various specimens of Crabs, &c.
10. Capt. R. Rollo, 50th Madras N. I. Three living Tortoises, from Vizigapatam, of the species *Testuda stellata*, Schweiger, v. *T. actinoides*, Bell, Dum. and Bibr. *Hist. Rept.* II, 66.
11. Baboo Srináth Mittra. A couple of young Cobras.

E. BLYTH.

Mr. Blyth's long supplementary Report upon the Society's collection of Australian Vertebrata, exhibited at the meeting, is postponed for the present.

*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Oct. 1847.*

| Days of the Month. | Maximum Pressure observed at 9h 50m. |              |                |       |                    | Minimum Pressure observed at 4 p. m. |              |                  |       |                    | Rain Gauges. |        | Moon's phases. |
|--------------------|--------------------------------------|--------------|----------------|-------|--------------------|--------------------------------------|--------------|------------------|-------|--------------------|--------------|--------|----------------|
|                    | Barometer reduced to 32° Fahrenheit. | Temperature. |                | Wind. | Aspect of the Sky. | Barometer reduced to 32° Fahrenheit. | Temperature. |                  | Wind. | Aspect of the Sky. | Upper        | Lower  |                |
|                    |                                      | Of the Air.  | Of the Mercur. |       |                    |                                      | Of the Air.  | Of the Wet Bulb. |       |                    | Feet 40      | Feet 4 |                |
| 1                  | In. 29.744                           | 77.0         | 76.0           | E.    | Rain.              | In. 29.659                           | 79.6         | 77.6             | E.    | Rain.              | 1.61         | 1.66   | ☾              |
| 2                  | .890                                 | 76.5         | 76.0           | E.    | Drizzly.           | .806                                 | 81.9         | 81.6             | S. E. | Cloudy.            | ..           | ..     |                |
| 3                  | .942                                 | 87.5         | 86.5           | S. E. | Cumuli.            | .833                                 | 87.4         | 87.4             | S.    | Cumulo strati.     | ..           | ..     |                |
| 4                  | .946                                 | 88.0         | 86.5           | S.    | Ditto.             | .814                                 | 90.0         | 88.0             | S.    | Cumuli.            | ..           | ..     |                |
| 5                  | .898                                 | 88.0         | 87.8           | S.    | Ditto.             | .770                                 | 90.4         | 89.0             | S.    | Ditto.             | ..           | ..     |                |
| 6                  | .883                                 | 89.0         | 88.0           | E.    | Cirro cumuli.      | .764                                 | 85.1         | 81.5             | E.    | Cloudy.            | 0.59         | 0.67   |                |
| 7                  | .920                                 | 76.2         | 74.8           | E.    | Rain.              | .779                                 | 83.0         | 82.5             | N. E. | Ditto.             | 0.70         | 0.77   |                |
| 8                  | .937                                 | 84.9         | 85.0           | W.    | Cumulo strati.     | .828                                 | 83.4         | 83.0             | N. W. | Cirro strati       | ..           | ..     |                |
| 9                  | ..                                   | ..           | ..             | ..    | ..                 | .801                                 | 88.4         | 87.0             | N. W. | Ditto.             | ..           | ..     |                |
| 10                 | .914                                 | 87.0         | 86.5           | N.    | Cumulo strati.     | .839                                 | 89.0         | 87.4             | N. E. | Ditto.             | ..           | ..     |                |
| 11                 | .951                                 | 87.0         | 87.0           | N. E. | Clear.             | .852                                 | 89.8         | 88.0             | S. E. | Clear.             | ..           | ..     |                |
| 12                 | .965                                 | 88.0         | 87.0           | S. E. | Cumuli.            | .839                                 | 89.4         | 88.0             | N. E. | Cumuli.            | ..           | ..     |                |
| 13                 | .946                                 | 88.0         | 86.5           | E.    | Ditto.             | .820                                 | 87.5         | 86.8             | E.    | Cloudy.            | ..           | ..     |                |
| 14                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 15                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 16                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 17                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 18                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 19                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 20                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 21                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 22                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 23                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 24                 | ..                                   | ..           | ..             | ..    | ..                 | ..                                   | ..           | ..               | ..    | ..                 | ..           | ..     |                |
| 25                 | .905                                 | 81.1         | 81.0           | N. W. | Clear.             | .784                                 | 85.0         | 83.7             | N. W. | Clear.             | 2.64         | 2.76   | ☉              |
| 26                 | .894                                 | 80.8         | 80.5           | N.    | Generally clear.   | .773                                 | 86.5         | 85.0             | N.    | Ditto.             | ..           | ..     |                |
| 27                 | .879                                 | 84.5         | 83.6           | N.    | Cumuli.            | .795                                 | 88.5         | 86.0             | W.    | Cumuli.            | ..           | ..     |                |
| 28                 | .930                                 | 85.0         | 85.5           | N. W. | Clear.             | .811                                 | 88.8         | 87.0             | W.    | Ditto.             | ..           | ..     |                |
| 29                 | .946                                 | 84.6         | 84.4           | N. W. | Ditto.             | .849                                 | 87.0         | 85.6             | N. W. | Ditto.             | ..           | ..     |                |
| 30                 | .938                                 | 83.5         | 84.0           | N.    | Cumuli.            | .893                                 | 86.5         | 85.0             | N.    | Clear.             | ..           | ..     |                |
| 31                 | .993                                 | 83.5         | 83.0           | N.    | Ditto.             | .888                                 | 87.0         | 85.0             | N. W. | Cumuli.            | ..           | ..     |                |
| Mean               | 29.920                               | 84.3         | 83.9           | 78.6  |                    | 29.803                               | 86.7         | 85.4             | 76.6  |                    | 5.54         | 5.86   | ☾              |

# JOURNAL

OF THE

# ASIATIC SOCIETY.

DECEMBER, 1847.

*An Attempt to identify some of the places mentioned in the Itinerary of HIUAN THSANG. By Major WILLIAM ANDERSON, C. B. Bengal Artillery.*

In the work, "FOE KOUE KI," or an Account of the Buddhist countries, translated from the Chinese original, by Remusat, revised and edited by Klaproth and Landresse, is given as an appendix the Itinerary of another Chinese traveller, HIUAN THSANG. These travels are concluded to have been undertaken in the 7th century; and the particulars narrated are made use of to verify the various places mentioned by Fa Hian, who is supposed to have travelled on his mission nearly two centuries earlier.

A desire to investigate the ancient accounts of North West India, led me to examine the itinerary of Hiuan Thsang with some attention. After no little trouble, I arrived at a theory which I have endeavoured to work into the present form.

We receive the original Chinese in the shape of a French translation made under circumstances of much difficulty.

The original work appears not to have been in the hands of the translators; who were necessitated to pick out the portions of it which existed in modern Chinese Encyclopedias; when to this difficulty we add the abstruse nature of the religious basis of the original, and couple with these the intricacies of the Chinese language, only commencing now to be studied and understood in Europe; we shall not be astonished if the translation be not perfect; but rather be compelled to admire the labour, study, patience and perseverance of the translators which have given to Europe this wonderful production.



In attempting to reach the identity of some of the places mentioned, after many failures I was induced to try the substitution of the Arabic and Persian alphabet for the French readings of the Chinese original names ; and my labours appear to me to have been rewarded with a success I had little anticipated.

My attention has been solely directed to the work in its geographical character. I have entirely abstained from any mention of those portions of the work which relate to the Buddhist religion ; entire ignorance forbids my touching on these topics, which I leave to those better qualified for such an undertaking—but to me it appears, that if my identifications will stand the test of further examination and criticism, they must destroy the antiquity claimed for the original, and in some degree shake the authority which is now being given to these Chinese books.

The French translator's appendix runs thus :—

#### ITINERARY OF "HIUAN THSANG."

"Hiuan Thsang visited the same countries as Chy fá Hian, but he extended his pilgrimage much farther than the latter. He traversed Tokharestan, Affghanistan, Scinde and almost every part of Hindustan : and his narrative, entitled *Si in ki*, or descriptions of the countries of the West, offers to us a complete picture of the state of India in the first half of the 7th century of our era. Unfortunately it is not possessed at Paris in its original and primitive forms ; it is only found in garbled fragments, though almost entire in the great Historical and Geographical compilation, which under the name of *Pian i tian*, contains the History of foreign nations, classed according to the epochs when they were first known to the Chinese, so that it was found necessary entirely to subvert the order which travellers have preserved in their recitals. It is this order I have endeavored to re-establish in as far as concerns *Hiuan Thsang*, in the resumé which follows, by the help of some indications lately published by M. Klaproth, and I believe I have accomplished it with exactness. The narrative of Hiuan Thsang has been so often cited in the notes to the Foe koue ki, and furnished so much useful knowledge, that a comparison embracing the travels of the two travellers cannot be considered as superfluous. I have indicated by a line this route thus restored upon the Chinese Japanese Map that accompanies the present volume."

7. *Sou tou li se na* (Osrouchna) touche à l'orient au fleuve Ye, qui sort des monts Tsoung Ling et coule au nord-ouest. Au nord-ouest on entre dans le grand désert de Sable.

اسرو شذنه

OSROOSHUNUH is a large district lying between Sumurkund and Khokan; Zeezuk of the maps is one of its chief towns. We find it mentioned in Edrisi, Vol. ii. p. 205-6. It is also entered in the Geographical lists of the Ayeen Akbaree, and Sadek Esfuhanee; but with the errors usual to all Latitudes and Longitudes written in the Abjud numeration. We may remark, the usual elision of the initial vowel, with the substitution of the CHINESE L for ARABIC R. The Sehoon or Jaxartes is known to the Chinese as the Ye.

The TSOUNG LING or blue mountains, constitute the chain, marked in our maps as the Pameer, Bolor and Kara Korum ranges; of which the Himalaya or Snow mountains are considered as branches.

Après 500 *li* on vient à

8. *So mo kian*, ou *Khang kiu*, ou *Khang*, (Samarkand).

سمرقند

Sumurkund is the well known capital; we may note the absorption of the R.

9. *Mi mo ho* (Meïmorg).

ماي و مرغ

MIMOHO, is a city known as Maemorgh, placed by Edrisi, Vol. i. p. 485, at one day's march from Nesuf or Nukhshub, lying to the east of Kesh or Shuhre Subz.

De là au nord

10. *Kiei pou tan na*, ou *Tsao*.

قواديان سورن

KIEU POUTANNA, or TSAO. In Edrisi, Vol. i. p. 480, we find قواديان, two journies from Termiz; a large town with a smaller one depending on it, called سورن Soorun. Now, here I note a particular point which appears to run through the whole of these transformations; either the sound of w has fallen on the Chinese ears as r, and hence been transmuted into p—or in reading from an Arabic or Persian copy in a hurried *Shukustuh* handwriting the tail of the و wao, has been turned up, and joining with the ا alef has taken the form of r, ف and been so read and accepted by the Chinese translator as 6 FA; he has

read the word Kofadeyan, Kieü poutan.—By dropping the final ㄣ N ; and the ㄐ r, as usual to the Chinese authors—we have Tsao for Soorun.

De là 300 li ouest,

11. *Kiou chouang ni kia*, ou *Koueï chouang no*. خچند

KIOU CHOUANGNI, I conclude to be a reading of Khojund.

De là 200 li ouest.

12. *Ko han*, *Toung'an*. خوقان

КОХАН is clearly Kookhan or Khokan.

De là 400 li ouest.

13. *Pou ho* (Boukhara) *Tchoung'an*. بخارا

POU HO, Bokhara ; is a fair example of the theory I am induced to propose,—Pouho is no identification of the sound, *Bokhara*,—the stress of the sound lies in the penultimate *kh* ; that the Chinese can receive and transmit this sound, we have proof in the two preceding places,—Khojund and Khokan ; of disappearance or change in initial or final letters we are constantly made aware—hence we need not pause on the usual change of *p* for *b*. But, if we suppose a Chinese author to be making up a geographical work, and consulting an Arabic or Persian book, for his guide—let the work be a Shukustah copy without diacritical points, and we shall be at no loss to understand his reading *p* for *b*—and *h* for *kh*—in بخارا—and hence ignorant of the real sounds—to have transcribed letter for letter and inserted the name as POU HO.

The reading *h* for *kh* runs through the whole work. It may be remarked, that in reading from manuscript proper names, with no assistance from the meaning of the terms—that it will be invariably found, that one formation of letters being once in the beginning accepted for certain letters and certain sounds, the same, right or wrong, will be carried through the whole work ; thus we shall find *h* substituted for *kh*—and *pa* for *wa*—or *p* or *b* or *f* for *w*.

De là 400 li ouest.

14. *Fa ti Si'an*. بدخشان

FATI SIAN—is clearly Budukhshan—the *kh* being read as *h* ; as an aspirate it has disappeared.

De là 500 li sud-ouest,

15. *Ho li si mi kia ou Ho tsin.* De So خوارزم  
mo kian.

HOLISIMI KIA, is almost letter for letter Kharism, the well known country to the North of the Oxus; of which Kheva is now the capital. The word is but a transcript of the ancient Greek term.

A 300 *li* sud-ouest,

16. *Ko chouang na ou Sse à 300 li sud-est* کشانیه کش شهرسبز  
la Porte de fer. دربند گه

KOCHOUANGNA or SSE, is probably the modern city of Keesh or Shuhr e Subz. We have a large district of Kushaneyuh—associated with Sogd by Ferdoosee.

While in Edrisi, Vol. ii. p. 203, we find Kushaneyuh on the north of the river of Sogd—27 miles from Ustejan, to the west of Sumurkund—this is probably the Kushaneyuh of Ferdoosee—and might be the original of the KOCHOUANGNA of the Chinese author. But the indication of 300 *li*. S. E. to Durbund or Kuhluga—(100 miles) is rather conclusive that the place pointed at is Kesh—or Shuhr e Subz.

De la à

17. *Tau ho lo* : à l'orient, les monts *Tsoung* طخارا  
*Ling* ; à l'occident, *Pho la sse* (la Perse :) au فارس  
midi, les grandes montagnes de Neige ; au nord,  
la porte de fer. Ce pays est au nord du fleuve در بند گه  
*Fa tsou* (l'Oxus). وخشاب

TOUHOLO—Tokhara—the same interchange of *h* for *hh*. According to Ptolemy once a considerable nation, ΤΟΧΑΡΟΙ, (Thocarorum magnagens; “Cluverius”) Constantly mentioned in the Moslem histories. The country extended on both sides of the Oxus, from the confines of Bokhara to Kabul : from Budukhshan to the limits of Persia. But the nation who held this district appears to have possessed dominant power over more extended limits at different periods.

We may remark here the introduction of the mode of description usual to Moslem authors. They first give a general outline of the country, with its bounding districts, and a list of its chief towns, then they enter upon particulars of each. Thus having a general outline of *Touhola*, our Chinese author proceeds to particulars.

En le descendant ou vient à



18. *Tan mi*, au nord du fleuve. *Fou sse* ترمذ  
*tsou* ; 10 *kia lan*.

TANMI—Termiz, a well known ferry on the Oxus.

De là à l'est

19. *Tchhi'ao yan na* ; 10 *kia lan*. صغانیان

Tchhi áoyanna, *Sueghaneyan*, where the diacritical point of the غ being omitted it has been read ع áo. وخستب is the type of Oxus.

The map to the Memoirs of the emperor Babur places Cheghanian a little east of Termiz. Edrisi has a district of this name near Sumur-kund, and also a town 4 journies from Termiz. The table in the Ayeen Akbaree places it a little west and north of Talkan.

De là à l'est

20. *Hou lou mo* ; 2 *kia lan*. خلم

HOULOUM, Kholum—the well known town.

De là à l'est

21. *Iu man* : au sud-ouest, touche à la rivière حضرت ایمان  
*Fa tsou*.

IUMAN—Huzurut Eman, on the Oxus—as stated.

De là à

22. *Kiou ho yan na* ; 3 *kia lan*. کرغانه کرغانه کرچیان

KIOU HO YANNA, may be Kurghan tuppū ; or one of those numerous districts inhabited by scattered tribes of Goorchees—whence the many Goors on our maps.

De là à l'est—

23. *Hou cha*. کوکچه غرچه

HOUCHA—Kookhchu ; given on the maps as the name of the river of Budukhshan—mentioned also as 4 days from Cashmeer, and 8 from Eskardoo. By Bernier, Cal. ed. p. 142.

De là à l'est—

24. *Ko tou lo* ; à l'est, les monts *Tsoung Ling*. کدور

KOTOULO is clearly Kutoor ; mentioned by all Moslem historians, as the country of the Seyah Poosh Kafirs.

De là à

25. *Kiu mi tho* ; monts *Tsounng Ling* : au sud-ouest, la rivière *Fa tsou* : au sud, le royaume de *Chi khi ni* ; au sud, en passant le *Fa tsou*, au vient aux royaumes de *Tha mo si thieï ti*, de *Po to tsang na*, de *Yin po kian*, de *Kiou Lang nou*, de *Sse mo tha lo*, de *Po li ho*, de *Ke li sse mo*, de *Ko lo hou*, de *A li ni*, de *Meng kian*, tous décrits dans l'histoire du retour. Du royaume de *Houo* (voyey No. 122), au sud est, on vient aux royanmes de *Houo si to et* de *An tha lo fo*.

چرکس چرکز

غور  
غورستان اندراب

KIU MI THO.—Kundoz I suspect.

CHIKHINI ; Cherkez, Circassia. From Kundoz the natural step is to Indurab and Ghoor. I have no doubt that a leaf has here taken its wrong place—for all the Chinese books, or perhaps Tibet and Mongolian, are written on separate single leaves—rather boards. Its most probable the misplaced portion commences at “au sud\*\*” and ends with “du retour.”

An attempt is made at the end to identify these places.

HOUO—Ghoor. Of all the countries and places known to Europeans by this name, I believe, *the Ghoor* to lie west of Bulkh, east of Meroo—and north of Kunduhur and Herat—but we find a Ghoree well defined on our maps east of Kholm—visited by Izzutallah, who calls it a well known town depending on Kundoz. HOUO SI TO, Ghooristan, will be its district.

AN THA LO FO—Indurab. We have mention of this place in almost all the histories of any movements between Tooran and Hindoostan ; it is given as a halting place of Temoor ; stands recorded in the Ayeen Akbaree as east of Talkan ; Izzutallah places Indurab one journey S. E. from Naruen. Sadek Esfuhanee mentions it as a town of Budukhshan, rather Tokharistan.

Au sud-ouest on vient à

26. *Fo kia lang*.

بقلان

FO KIA LAN—Buklan—placed by Izzutallah at two jourmies from Ghoree. A halting-place of Temoor before he marched to the attack of the Siyuh Posh Kafirs.

De là au sud

27. *Ke lou si min kian.*

قلعة سمنگان

KELOU SI MINGAN—Kulu Sumungan. Here we have CLEARLY and DISTINCTLY the Arabic word قلعة Kulu, for a fort. This situation is made by Ferdoosee the scene of the amour of Rostum with the daughter of the chief of the tribe; from which adventure arises the affecting story of Soohrab. The Ayeen Akbaree tables also furnish the locality near Talighan; while Sadek Esfuhanee places the fort in Tokharestan; so that all agree.

De là au nord-ouest.

28. *Hou pin ;—10 kia lan.*

غوربند

HOU PIN.—Old classical associations would almost persuade me to read this word Koofin, the κωφην of the Alexandrian expedition. And here I pause to ask a question; Where are the most ancient works which contain this word of κωφην κωφης Koofen, Koofees? Between the Greek capitals P for R, Φ for f ph, there is only the half circle to the left to discriminate between the letters; a slight blot or flourish would cause the P to become Φ, so that perhaps the original word was Goores—and hence many difficulties may be cleared up, but the analogy of my former readings compels me to adopt Ghorbund. The r dropt with other interchanges quite common.\*

De là à l'ouest

29. *Fo ko* (Badakchan :) au nord, il touche à la rivière. *Fa tsou*; la capitale s'appelle la petite Ville Royale; 100 *kia lan*. Au sud-ouest de la capitale est le *Na fo seng kia lan* (Nouveau monastère). Ou entre dans les montagnes de Neige,

بلخ

نوبهار

FOKO—Bulkh—not Budukhshan.

The capital of this latter can hardly be considered to stand on the Oxus; the river on which it is built is known by the name of the

\* Lassen (*Zur Geschichte der Griechischen und Indoskythischen Könige*, page 150) identifies *Hou pin* with the pass *Upián* or *Hupián* of Baber. According to a note to the passage referred to in the English version of Baber's Memoirs, this pass is situated a few miles north of Charikar on the way to Perwan. The Cophen is designated *Ki pin* by Chinese writers; and Arrian's description—Κωφὴν δὲ ἐν Πευκελαήτιδι, ἧμα οἱ ἄγων Μάλαντόν τε καὶ Σόαστον, καὶ Γαρ' ῥοίαν, ἐκδιδοῖ ἐς τὸν Ἰνδόν, places its identity with the Cabul river beyond question.—EDS.

Budukhshan or Kook-chuh river ; while Balk clearly has the Oxus to its north. There was a celebrated Fire temple at Bulkh called Noo Buhar.

Et on vient à

30. *Youëi mi tho.*

هرمز

YOUËI MI THO—Hoormuz, “c’est une ville de moyenne grandeur ;” in the district of Merve near Talkan, according to Edrisi, Vol. i. p. 467 = ١ without the lower mark clearly readable for ي ye.

Au sud-ouest, on vient à

31. *Hou chi kian.*

قرچگان خرجگان

HOU CHI KIAN—Gorjegan, Goor being the district between Bulkh and Merve.

Au nord-ouest, on vient à

32. *Ta la kian* (Talkan) : à l’ouest il touche  
à *Pho la sse.*

طالغان

فارس.

TALA KIAN—The Talkan near Merve—“une ville dont l’importance egale a peu près celle de Merve ol Roud.”—Edrisi. This is *the* Talkan usually indicated by Moslem writers,—of which the description is often affiliated on the Talkan of Budukhshan. There is also I believe a third Talkan still nearer to Persia.

*De Fo ko*, à 100 *li* au sud,

33. *Ko tche* : au sud-est, on entre dans les  
montagnes de Neige.

کرجی غرچی

KOTCHE—Koorjee.

34. *Fan yan na* (Bamiyan)—à l’est, on entre  
dans les montagnes de Neige, on passe les Pics  
noirs.

بامیان

FAN YAN NA—Bameeyan, the celebrated town of this name, well known ; it was destroyed, with every kind of cruelty on the inhabitants, by Chungées Khan. Here we notice, م mím, read as نون n.

On vient à

35. *Kia pi che* (Caboul).—La ville est adossée  
aux monts *Tsoungh Ling*. Au sud de la ville, à  
40 *li*, ville de *Si pi to Fa la sse*.—De là à 30 *li*

کابل

اصتالف



sud, mont *A lou nao*. Royaume de *Tsao kiu tho*; mont *Sse na sse lo* (Sse na, nomdim Déva). Au nord-ouest de la ville royale à 200 *li* les grandes montagnes de la Neige: là était l'ancien royaume de *Kian tha lo*. Au sud-ouest de la même ville, le mont *Pi lo so lo* (solide comme un éléphant). De là au nord, le *Kia lan Pi to kieï* ou de l'alisier mordu.

للذدر  
لهوگرد

کندھارا  
پل زور  
بتکاک

KIA PI CHE. Clearly Kabul; why خ is substituted for ل is a question determinable probably by Chinese orthography.\* The particulars mentioned of this place are not so clear. SIPITOFALASSE may be Estalif, a well known town to the north of Kabul. Mont ALOUNAO, has an appearance of *Aornus*, and would almost point to the assistance of European writers in this Chinese Geography; or, it may be an attempt to transcribe Lulundur للذدر. TSAO KIU THO is Lhogurd; the لهو Lho having been read تسو Tso.

KIAN THALO.—200 *li* to the north-west, would point to the direction of modern Kundahar—here designated the ancient location of the tribe; thus proving the knowledge of the existence of two places of the name.

PI LO SO LO—Clearly Peelzoor, as interpreted; † which may be a Persian name for the celebrated defiles called in Arabic Khuebur; or may have a reference to Bajoor—or Khord Kabul. Hardly a Peak in these countries is without a name.

PI TO KIEU. I suspect Butkhakh.

De là à l'est, à 600 *li*, par les defilés impraticables des Pics noirs, ou vient à la frontière de l'Inde du nord, et à

36. *Lan pho*,—adossé au pics noirs.

لمغان

LAN PHO. *Lumghan*; we shall find غ gh constantly transcribed as ف ph.

De là au sud est, à 100 *li* passant la grande chaîne and traversant le grand fleuve ou vient à

\* Identified by Lassen with the *Capissa* of Pliny, the *Καμισα* of Ptolemy. It is placed by the latter two degrees and a half North of *Kabura*, otherwise called *Ortospana*. In the former word we have the probable etymology of the modern Kabul; the latter Wilson conjecturally amends to *Ortostana*, in Sanskrit *Urdhastāna*, 'the high place,' in reference to the elevated plain on which Kabul is situated. See *Ariana antiqua*, p. 176.—Eds.

† सिद्ध *pilla* सार *sāra* agrees better with the Chinese transcript; 'strong as an elephant.'—Eds.

37. *Na ko lo ho*, limite de l' Inde du nord : entouré de montagnes de tous côtés. A l'est de la ville à 3 *li*, stoupa de 300 pieds, bâti par li *Roi Asoka*. Au sud-ouest de la ville est un stoupa de l'ancienne ville ou *Shákya Bodhisattwa* acheta des fleurs pour le *Bouddha Dipankara*. Autre bâti par *Asoka*.

نك نهار

NA KO LO HO—Nungnuhar, the old name of the modern district of Julalabad.\* So mentioned in the Ayeen Akbaree. In the Journal of the Asiatic Society for January 1837, is given from the London Asiatic Journal, the Chinese account of India,—it mentions :—"In the year A. D. 983, the arrival of a Buddha priest in China, with a letter, who stated it was from the kingdom of WOO TEEN NANG, (Oudiana !) that this kingdom belonged to YINTOS of the north, (Northern India) that in 12 days from the west (TO THE WEST ?) you arrive at the kingdom of KHANTOLO, Gundhara ; twenty days further to the west you reach the kingdom of NANG GO LO HOLO (Nungnuhar) ; ten days further to the west you come to the kingdom *Langho*, (Lumghan ; ) 12 days more to the west is the kingdom of GOJENANG, (Guznee ; ) further to the west that of Posze, (Persia.) A simple statement of the chief towns on the grand road from Cashmeer to Persia.

Au sud-est 500 *li* au travers des montagnes, on vient à

38. *Kian to lo* (Gándhara) (Inde du nord). A l'est, il touche au fleuve Sind. La capitale s'appelle Pou lou cha pou lo. Arbre *Pipala*. Kia lan du roi Kia ni sse kia (400 ans après le Nirvân'a de Foe). Au nord-est de-ce dernier à 50 *li* en passant le grand fleuve, on vient à la ville de Pou se ko lo fa ti. Au sud-est de Chang mou kia Phou sa, ville de Pa lou cha. Au nord-est à 50 *li* de Pa lou cha, temple de *Pi ma*, femme d'*Iswara*. De là au sud-est à 150 *li*, ville de *Ou to kia han tekha* qui touche au sud de l'Indus. De là au nord-ouest à 20 *li*, cite de Pho lo tou lo,

گندھارا

پرشاور

سندک مہابت

ایک

پرتور

\* This is the Chinese transcription of *Nagara*, a town ; Lassen first pointed out its identity with the *Nayapa* of Ptolemy.—EDS.

lieu de la naissance de l'ermite Pho ni ni fondateur de la musique.

KIAN TOLO. This is the Ghundara of the Sanskrit, the Kundara Gandaridæ of Strabo, and other ancient Greek Geographers. We find it constantly mentioned in the history of Cashmeer, as a neighbouring country at war or at peace with Cashmeer; we have a notice of it in the Ayeen Akbaree, Vol. ii. p. 151, in the days of the first Moslem conquests; Seenuhdeo being the last Hindu king of Cashmeer. In the Ayeen Akbaree it forms the district of Puckely, lying between Cashmeer and Utok; on the north, Suwad and Bajoor. The modern districts of Peishawur constitutes a portion of what formed the Kundhara district. The Ayeen Akbaree says, "Tooman Bekram, commonly called Peeshore, enjoys a delightful climate. Here is a temple called Gorekehtary, a place of religious resort particularly for Jowgies." But in the Geographical tables we have *Pershawur* پرساور commonly called Peeshawur. And so I find in most copies, the word to be *Pershawur* called Begram, with the *r*. We have also the high range called Purushnath, at no great distance. Kundhara is also enumerated long east of Ghuznee, while a former one has been alluded to though not placed, in "Muemund, now a dependent on Kundahar,"—the modern city. A difference of longitude of 26 degrees exists thus between the two places of the same names.

In *POU LOU CHU ROULO*; with the interchange of *f* for *w* we have clearly *Pershawur*.\*

At 150 li S. E. or 50 miles, *OUTO KIA HAN TCHHA*—Utok; ——— something to correspond with the usual discriminative "*Benarus*," commonly added to Utok; may be Gunj or Khan Suræ. That this identification is correct, is proved by the next word, *PHO LO TOU LO*, clearly the ruins placed a few miles S. W. as "*PERTORE* ruins," on our maps; one simple proof superior to an accumulation of several weaker points of evidence.

De là passant au nord les montagnes and les rivières à 600 li on vient à

39. *Ou tchang na* (Oudyana) (Jardin) limite de l'Inde du nord. Capitale Meng Ho li.

افغان اوجانه  
اوغانه منكلور

\* It is more probably the Chinese transcript of *Purushapûra*, a name common in the *Purânas*. Akber is said to have built, or improved this town and to have imposed its present name, Peshawur, in reference to its position on the frontiers.—Eds.

Au nord-est de la capitale à 250 au 260 *li*, on entre dans une grande montagne, et on vient à la source A pho lo lo, qui est celle du fleuve Sou pho fa sou tou, lequel coule au sud-ouest. Au sud-ouest de la source à 30 *li* sur la rive septentrionale du fleuve, est une empreinte du pied de Bouddha. Au sud de Meng ho li à 400 *li*, mont Yi lo et à 200 *li* grande forêt Ma ha fa na. De là au nord-ouest à 30 an 40 *li*, Ma iu kia lan, monastère des Fèves. De là à l'ouest, à 60 ou 70 *li* monastère fondé par Asoka. Au sud-ouest de Meng ho li, à 60 ou 70 *li* monastère du Roi Chang kiun. A l'ouest à 50 *li* passant le grand, fleuve, monastère d'Asoka, nommé Lou yi ta kia, ou rouge. Au nord-est à 30 *li* monastère de Ko pou to. De là à l'ouest passant le grand fleuve, image d'*A fo lou tchi ti che fa lo Phou sa*. De là au nord-ouest, à 140 an 150 *li* mout Lan pho lou. Au nord-est de Meng Ho li en passant les montagnes et remontant le Sind, faisant 1000 *li* a travers des chaines de montagnes, des ponts volants de fer, &c. vient au ruisseau Tha li lo, où était autrefois la capitale de l'Oudiyana.

مهابين

لعل تکیه

داردو

OUTCHANGNA—Sanskrit, Oudyana.\*

This country stands in the Ayeen Akbaree as Suwad and Bajoor. I have no trace of it to exhibit, except that our map-makers have placed two towns called Ooch in this district above Bajoor. I am inclined to read the word as Ooghan—the origin and not the corruption of the word Affghan. In some of the best and clearest written copies of the most classical works, the term used is Ooghan. On the other hand, if Outchang, in Oudyanuh its Sanskrit prototype, can stand the test of examination, I believe in it we may find the oft sought origin of the Affghan nation; for the Arabs would no doubt gutturalize the Indian radical Oodyan or Oojan, and hence the rise of Ooghan, Afghan, Putan. Mungloor we know as the capital of this country, which has been visited by no European that I am aware of, hence the details cannot be

\* According to Professor Wilson this should be *Ujjāna*.—Eds.



followed. MAHA FANA is a direct transcription of Maha vana, grande-forêt, while I am almost tempted to read LOUYI TA KIA as Lal tukeyuh? THALILO may have relation to Darduh, Durbund, and Dhar on the Indus. It may be borne in mind, that the Dorrancee kings had but little influence in these parts. That the remnant of the ancient population, probably Hindus, asserted not to be Moslem in the present day, now exist in the Siyuh Posh Kafirs,—that in the days of Akbar constant invasions of these parts were carried on; that Babur boasts of his forays on the lands of these semi-Hindus; while in the days of Timoor and previously it was considered a work of religious merit to exterminate these Kafirs—then as now, almost unknown.

De là à l'est, passant les montagnes à 500 *li* ou vient à

40. *Po lou lo* entre les montagnes de Neige. بلور

POLOULO—Beloor.—The district of the high range known by this name; placed by the Ayeen Akbaree tables close to Cashmeer.

OUTOKIA—Utok, the river made one mile wide!

Retour à Ou to kia han tchha (voyez No. 38).  
Passant au midi le *Sind*, qui est large de 3 or 4 *li*  
and coule au sud-ouest, ou vient à

41. *Tan tcha chi lo* (limite de l'Inde du nord)  
dépendant du Cachemire. Au nord-ouest de la  
capitale à 70 *li*, étang du dragon. *Yi lo po tan lo*.

پنچور

De là, sud-est 30 *li*, monastère bâti par Asoka  
(aumône de la tête). Pays du roi *Tchen tha lo*  
*po la pho* (lumière de la lune). Séjour du maître  
*King pou keou ma lo loto*. Au sud-est de la ville,  
stoupa bâti par le fils d'Asoka, Keou lang nou.

چندر

TAN TCHA CHI LO.\* Punch—Punjal; one of the celebrated passes into Cashmeer. These various Khonds or tanks can only be identified on the spot, being local myths. “Pays du roi Chundur —.” Something connected with lumière. The history of Cashmeer is interwoven with stories of these wonderful dragons.

De ce pays, au sud-est à 700 *li* à travers les montagnes,

\* This is no doubt the Takshasilâ of the *Vâyu Purâna*, mentioned in a note to Wilson's valuable translation of the *Vishnu Purâna*, page 386, and identical with the Taxila of the historians of Alexander. It is evidently the same place which Fa Hsian names *Tcha cha chi lo*, and could not be far from the site of Manikyala.—Eds.

42. *Seng ho pou lo* (limite de l'Inde du nord) dépendant du Cachemire à l'ouest il s'appuie sur le fleuve Sind. Au sud de la capitale, stoupa fondé par Asoka. Au sud-est à 40 or 50 *li* un autre fondé par le même.

سنگپور

Rètour à Tan tcha chi lo. Ou passe le Sind au nord de ce pays. Au sud-est à 200 *li* grande poste de piene. Stoupa bâti par Asoka (anmône du corps).

پنجپور

SENG HO POU LO.—Senghpoor. I have no doubt there are several places of this name.

De là au sud-est, par les montagnes, 500 *li* à

43. *Ou la chi* (limite de l'Inde du nord) ; dépendant de Cachemire. Ne suit pas la loi de Foë. Au sud-ouest de la Capitale, à 4 ou 5 *li* stoupa bâti par Asoka.

اوجہ

OULACHI.—May be Ooch.

De là au sud-est, montagnes, ponts de fer ; après 1000 *li*, on arrive à

44. *Kia chi mi lo* (Cachemire) limite de l'Inde du nord. Fondé 50 ans après le Nirvâna par *Mo tian ti kia* disciple d'Ananda. La capitale s'appuie à l'ouest sur un grand fleuve. Il y a quatre stoupas bâtis par Asoka.

کاشمیر

Asoka, roi de Magadha 100 ans après *li* Nirbân'a.

Kia ni sse kia roi de Gandhara 400 ans après le Nirvâna.

Sse ma tsiu lo, roi de Tou ho lo 600 ans après le Nirvân'a.

Au sud est de la nouvelle ville, à 10 *li* ancienne ville.

KIA CHE MILO.—Kashmeer, کاشمیر, me che kia. In all instances we find the Chinese author to repudiate final quiescent consonants ; almost every letter is vowelized, as if inherent to the letter : the long quiescent Arabic vowels are generally treated as consonants.

Au sud ouest, passant par les montagnes, 700 *li*, on vient à.

45. *Pan nou tcha* (Pendjab) dépendant du پنجاب  
Cachemire.

PAN NOU TCHA.—Punjab, dependent on Cashmeer : the period when this was a fact, might give a clue to the date of this work in its original.

De là an sudest, 400 *li* à,

46. *Ko lo tche pou lo* (dépendant du Cachemire.) گورکپور

Tous les pays, depuis Lan pho jusqu'à celui-ci, لہمان  
sont sauvages, les habitants grossiers, les langues  
barbares. Ce n'est pas la véritable limite de l'Inde,  
mais une civilisation détournée de ses frontières.

KO LO TCHE POULO.—Goorukpoor ; no doubt there are several places of this name.

LANPHO.—Lumghan, already noticed. The author has followed almost a straight easterly route.

De là au sud-est, passant la rivière à 700 *li*,

47. *Tshe kia* (limite de l'Inde du nord.) A شکارپور  
l'est la rivière Pi po tche : à l'ouest, le fleuve Sin کچھ بہوج  
tou : au sud-ouest de la grande ville à 14 an 15  
*li* ancienne ville de Tche ko lo, où régnait il ya سکور  
plusieurs siècles le roi *Ma yi lo kiu lo*. Stoupa مہرکل  
du roi Asoka. An nordest de la nouvelle ville,  
autre stoupa.

TSHE KIA, رکا ش—Shekarpoor, no doubt a boundary of N. W. India, towards India proper. I find no early mention of this place even in the Ayeen Akbaree. It, as a large district, is bounded by the waters (*Run*) of Boojh. Pi po tche ح و ب TCHE KO LO, Sukur—we have mention of Mehr kul in the history of Cashmeer, a “shameless tyrant, but heaven permitted him to make considerable conquests.”

De là à l'est 500 *li* à

48. *Tchi na pou ti* (érigé par les Chinois) : چین و ات  
limite de l'Inde du nord. Lieu où était le do-  
maine du roi *Kia ni sse kia*. Les pêches et les poi-  
res y ont été introduites par un prince Chinois ;  
d'où les poires ont reçu le nom de Tchi na ni  
(venues de Chine), et les pêches celui de *Tchi na* چینی شہدالو  
*lo tche fe ta lo* (fils du roi de la Chine.)

An sudest de la grande ville à 500 *li*, monastère de Tha mo sou fa na (forêt obscure). Là a vécu le docteur *Kia to yan na*, 300 ans après le Nirvân'a. Monastère fondé par Asoka.

TCHI NA POU TI.—Cheenwat, reading the wa—as pa—clearly the Cheenyout of our maps on the Chinab. In TCHI NA LO TCHE FE TA LO, we have the simple Persian words *Cheene shuftaloo*, China peaches, as the interpretation indicates ; this was one of the first readings which led me to the present attempt.

De là an nord-est à 140 an 150 *li* à

49. *Tche lan tha lo* (limite de l'Inde du nord :) anciennement brahmanique. چاندور

TCHE LAN THA LO.—Clearly Julundur.

De là au nord-est, franchissant des montagnes escarpées, 700 *li* à

50. *Khiou lou to*, limite de l'Inde du nord ; environné de montagnes, et voisin des montagnes de neige. Stoupa bâti par Asoka. کلات

De là au nord, 2000 *li*, au travers des montagnes, on arrive au royaume de Mo lo pho, aussi nommé San pho ho. مرغاب سرخس

KHIU LOU TO.—Kulate Gulzee or Kulate Nuseer. The former I suspect. A boundary of the north-west. and touching the snow ranges.

MO LO PHO.—Morghab ; the غ gh read as usual ف SANPHOHO may be an attempt at Surrukhs سرخس.

De Khiou lou to, au sud 700 *li* passant de grandes montagnes et un grand fleuve, on vient à.

51. *Che to thou lou*, limite de l'Inde du nord : borné à l'ouest par un grand fleuve. Au sud-est de la ville à 3 au 4 *li* stoupa bâti par Asoka. خوزدار

CHETOTHOULO.—Khoozdar.

De là au sud-est, à 800 *li* à

52. *Pho li ye tha lo*, limite de l'Inde du milieu. Le roi est de la race de Fëi che.

PHO LI YE THA LO.

De là à l'est, 500 *li* à



53. *Mo thou lo* : (Matoura) Inde Moyenne. مٹورا  
Trois stoupas bâties par Asoka. Maison de pierre  
où *Ou pho kieou to* a prêché.

MO THOU LO.—Muthra.

I have not the knowledge to enable me to follow our author into central India.

108. *Ma yi che fa lo pou lo*. (Inde moyenne) 3000 *li*. ماچھی واریہ

Hérétiques ne croyant pas à la loi de Foê.

MAYECHEFOLOPOULO.—Macheewaruh ; *wa read fa* as usual. The well known place Macheewaluh.

De là retournant à Kiu tche lo, au nord, traversant un désert, passant le Sin tou, on arrive au royaume de.

109. *Sin tou* (Sind) (Inde occidentale), 7000 *li* de tour. La capitale Pi tchen pho pou lo. Le roi est de la race *Chou to lo*. Asoka y a bâti beaucoup de stoupas. *Ou pho kieou to* a parcouru ce royaume. سند  
بھیکمپور بھیکانیو  
چتور

SINTOU.—Sindab, Scinde ; the capital PITCHEN PHO POU LO, perhaps Bheekumpoor, near Bhekaneer, Soobuh Ajmeer ; the *mim* taken for ف or غ as before remarked.

King of the race of CHOU TO LO ; Chutoor, a celebrated tribe of Rajpoots. OUGHO KUOU TO, overran the whole of this country.

De là à l'est, 900 *li*, passant sur la rive orientale de l'Indus.

110. *Meou lo san pou lo*. (Inde occidentale), 4000 *li* de tour. Beaucoup d'adorateurs des dieux, peu de Bouddhistes. ملتان پور

MEOU LO SAN POU LO.—Moltanpoor.

De là au nord-est à 700 *li*,

111. *Po fa to* (5000 *li* de tour) Quatre stoupas d'Asoka ; vingt temples d'hérétiques. Lieu où le maître *Tchin na fe tha lo* (très vainqueur) a composé son livre. بہاول پور

PO FA TO.—Bahawilpoor. I am not satisfied with the reading.

De Sin tou, au sud-ouest à 15 au 1600 *li*,

112. *A thian pho tchi lo* (Inde occidentale) 5000 *li*. La capitale s'appelle *Ko tchi che fa lo*. Les murs sont à l'ouest près du fleuve Sin tou, et voisins du bord de la grande mer : Pas de roi, dépendant du Sin tou. Asoka y a bâti six stoupas.

ادینه کچرات

کراچی

A THIAN PHO CHI LO.—Adeenuh, Gujerat. The place indicated is clearly a district on the sea coast. Adeenuh is a large town in the Sircar of Surat, Soobuh Gujerat ; mentioned in the Ayeen Akbaree, with a harbour for ships. The capital *KO TCH CHE FA LO*.—Kurachee poor!? I should almost doubt this reading, for a capital of Guzerat, but the loose connection between other established and identified places leaves us ample room for even such a jump. Kurrache is clearly on the coast and on the west of the Indus.

De là à l'ouest à moins de 2000 *li*,

113. *Lang ko lo* (Inde occidentale) plusieurs milliers de *li* en tous sens. La capitale s'appelle *Sou tou li che fa lo*. Ce pays est sur le bord de la grande mer. Il y faut passer pour aller chez les Femmes d'occident. Pas de roi : il dépend de *Pho la sse*. Les caractères sont semblables à ceux des Indiens. La langue est un peu différente. Dans la ville, un temple de Maha Iswara.

کرمان

صندل پور

زنکبار

فارس

LANG KOLO.—This district on the sea, possessing ports for Zungbar, and depending on Persia, must be either Kerman or Mukran. The word reads as Lungoor, which I almost think I have seen in relation with this coast. It may be Punjgoor, which is a large town of Kuch Mukran. We have Rajahs of Sundul mentioned by Ferdoosee in the direction of Kerman. I suspect the Chinese author read of some port of embarkation for Zungebar, he seized with alacrity on the known word *zun*, for women, and manufactured the translation of western from some fancied form derived of *عرف*, west, or any similar root.

De là au nord-ouest.

114. *Pho la sse*. (Perse) (non compris dans l'Inde) plusieurs fois dix mille *li* de tour. La

پارس

capitale s'appelle Sou la sa tang na. Beaucoup de temples où les disciples de *Thi na pa* font leurs adorations. Deux ou trois monastères. Tradition relative au pot de Foè. (Conf. *Foé koué ki*, Chap. xxxix.) A l'est du palais du roi, ville de Hou mo. Ce pays, au nord-ouest touche à Fe lin. Au sud-ouest de Fe lin, royaume des Femmes d'occident, dans une île de la mer du sud-ouest.

شیرازستان

قم  
فرنگ

PHOLA SSE *فارس*, Persia. The capital SOU LA SA TANG NA—*Sherazistan*; THI NA PA may have a reference to fire worship. Palace of the kings HOUMO, *Kom*, the ancient town of this name, where the kings of Persia were buried. This country, at the north-west, touching FELIN, may have some general reference to *Ferung* or Europe.

De A thian pho tchi lo, au nord à 700 *li*,

115. *Pi to chi lo*. (Inde occidentale) 3000 *li* de tour. Ce pays est sans roi : il dépend du Sin tou. Au nord de la ville à 15 ou 16 *li*, dans une grande forêt, stoupa de plusieurs centaines de pieds bâti par Asoka. Non loin à l'est, monastère bâti par le grand Arhan Ta kia ta yan na.

بهگر

PI TO CHI LO.—Buhkur; there are two places of this name, Buhkur at Roree, which may be the place here indicated; or Bukur in the Doabuh, between the Jheelum and Chenab rivers.

De là au nord-est à 300 *li*,

116. *A pan tchia* (Inde occidentale) 2400 ou 2500 *li* de tour. Pas de grand roi : il dépend du Sin tou stoupa bâti par Asoka.

پنجاب  
اوچه

A PAN TCHIA *اوج* : Ooch. The *و* read as f or p. Rather a questionable reading.

De là au nord-est à 900 *li*,

117. *Fa la nou*. (Inde occidentale) 4000 *li* de tour. Ce pays dépend de celui de Kia pi che. La langue a peu d'analogie avec celle de l'Inde

خاران باران  
بولان  
دامان

moyenne. Ou dit que ce pays touche, à l'ouest, à Khi kiang na dans les montagnes.

FALANOU.—Analogy would point to *Baran, Bolan*. Perhaps *Daman*; for there is no saying what may be the reading given to Shukustuh nay Nustalikh writing without points, on the absence of any sense to guide to the proper word. It must be some place dependent on Kabul, and touching KHI KIANG NA, which perhaps is Guznee, Guzneen. Daman will fulfill both these conditions, but the identification is not happy.

De là au nord-ouest on passe de grandes montagnes et de larges courants, on traverse de petites villes, et après 2000 *li* on sort des limites de l'Inde, et on arrive á

118. *Thsao kiu tho*, (7000 *li* de tour). Langue et caractères particuliers. Stoupas bâtis par Asoka. Temple du Dieu *Tsou na*, venu du mont A lou nao, près de Kia pi che.

لهوگرد

THSAO KIU THO.—Already given as Lhogurd.

De là au nord à 500 *li*,

119. *Foé li chi sa tang na* (2000 *li* de l'est à l'ouest 1000 *li* du sud au nord). La capitale s'appelle Hou phi na. Le roi est de race Thou kioueï (turque). Il est attaché aux trois Précieux.

بلوچستان

خاران

FOE LI CHI SA TANG NA.—Baloochistan, the capital HOU PHINA, Kharan. To the north-east, over rivers and mountains, skirting the boundaries of Kabul, would reach the range of GHORESTAN, which is the name for the Koh Baba summit, whence issues the Helmund according to all Moslem Geographical works; now Koh baba is the highest point of the chain.

De là au nord est, passant les montagnes, franchissant les rivières et sortant des limites de Kia pi che, après dix petites villes, on atteint les grandes montagnes de Neige et la chaîne Pho lo si na. C'est le plus grand pic du Djambou dwipa. Pendant 3 jours on descend et on arrive à



120. *An tha lo pho*, (ancien pays de Tou ho lo). 3000 *li* de tour.

Pas de grand roi : il est soumis aux Thou kioueï. Stoupa bâti par Asoka.

AN THA LOFO.—Indurab, as before. But there is also a most fertile Canton of this name in the country of Ran on the Araxes. Edrisi, Vol. ii. p. 321.

De là au nord-ouest en entrant dans les vallées, en franchissant les chaînes et passant par plusieurs petites villes, à 400 *li*.

121. *Houo si to*, (anciennement pays de Tou ho lo.) 3000 *li* de tour. Pas de grand roi, soumis aux Thou kioueï. •

غورستان  
کرستان

HOVO SI TO.—Ghoristan of Tokhara. But this may be Kuristan, the districts on the Kur, west of the Caspian.

De là au nord-ouest en passant les montagnes, les vallées et plusieurs villes, on arrive à.

122. *Houo*, (anciennement pays de Tou ho lo), 3000 *li* de tour. Pas de souverain soumis aux Thou kioueï. Beaucoup croient aux trois Précieux. Peu honorent les esprits. A l'est on entre dans les monts Tsoung Ling, les monts sont au centre du Djambou dwipa. Au sud ils tiennent aux grandes montagnes de Neige. Au nord, ils vont jusqu'à la mer chaude et aux Mille sources. A l'ouest, jusqu'au royaume de Houo, et à l'est jusqu'à Ou chaî : ils ont plusieurs milliers de *li* en tous sens.

غور  
خوي

غور

HOVO.—Ghoor or may be Khooee near the Araxes.

TSOUNG LING.—The Blue mountains, extending from the Merchaude, to the Himalaya of snow, from this Ghoor on the west to Ouchai on the east. We have here some repetition of what is formerly given subsequently to the district Chikhini. This latter belongs in my opinion to another portion of the work ; at such interchange and con-

fusion we are not to wonder, when we bear in mind that the French Editor had not the entire work before him; but was forced to collect the places named from various different books. I suspect the leaves have become transposed and wrongly placed—for from Ghoor of Budukhshan we find ourselves carried suddenly to the west side of the Caspian, and to this cause we may attribute the repetition just passed of Indurab, Ghoristan for Kurestan, Ghoor for Khooei. Our Chinese author having fallen on these names west of the Caspian, and affiliated them on those he had already described east of the same sea. In truth this is the grand error of all Moslem Geographical works. Making no allowance for two places under the same name, always considering them as identical; and carrying routes to and from the one, which in reality belong to the other; of this I could give many proofs.

Vers l'est, à 100 *li* on vient à

|                                                   |       |
|---------------------------------------------------|-------|
| 123. <i>Meng kian</i> , (anciennement pays de Tou | موقان |
| ho lo). Pas de grand roi : il est soumis aux Thou | موغان |
| kioueï.                                           |       |

MENG KIAN.—Moghan near Salian; on the Kur, the celebrated plain where Nadir Shah before the assembled tribes assumed the crown of Persia. Placed by Edrisi as a dependent district on Azerbeyujan. By Sadek Esfuhanee near the Caspian; it is also entered in the tables of the Ayeen Akbaree.

An nord on vient à

|                                                       |       |
|-------------------------------------------------------|-------|
| 124. <i>A li ni</i> (anciennement pays de Tou ho      | الوان |
| lo). Embrasse les deux rives de Fa tsou 300 <i>li</i> | اران  |
| de tour.                                              |       |

A LI NI.—Aran, on the Nuhr ulras, Araxes. Arran, اران, a tract of country situated between the provinces of Azerbaejan, Shervan and Armeneyuh. To Arran belong the cities Mooghan, موغان, and others. —Sadek Esfuhanee.

*Lying on both banks of the Fatso, or Oxus*; this is but a portion of an old and far extended Geographical error, which connected, first the Oxus with the Uturuk or river of the Torks, and then with or without intervention of the Caspian, made the Araxes also a continuation of the same river. The Chinese author may have found in some works the Arran lying on both banks of a river, and from his own idea

given the name. This supposed identity of the Uturuk and the Oxus is the real cause of all the stories of the Oxus having once fallen into the Caspian.

A l'est on vient à

125. *Ko lo hou*, (anciennement pays de Tou ho lo) touche au nord, le Fa tsou.

کورگان  
جرجان جرقان

KOLO HOU.—Goorgan? The old mistake of the Uturuk for the Oxus—Joorjan of our maps.

A l'est passant la chaîne après plusieurs cantons et citès, à 300 *li*,

126. *Ke li se mo*, (anciennement pays de Tou ho lo). 100 *li* de l'est à l'ouest, 300 du nord au sud.

خراسان

KELISEMO.—Khorasan, the well known district of the *Sun*.

Allant an nord-est on vient à

127. *Po li ho*, (anciennement pays de Tou ho lo), 100 *li* de l'est à l'ouest, 300 *li* du sud au nord.

بلغار

POLIHU. Reads like Balkh; which lies in a north-east direction from Khorasan, might stand for Bulghar.

KE LI SE MO. Kharism; in the former part we had Holisemikia as Kharism.

De Ke li se mo passant les montagnes, à l'est à 300 *li*, on vient à

خوارزم

128. *Sse mo tha lo*, (anciennement pays de Tou ho lo), 3000 *li* de tour. A l'ouest des monts Tsoung Ling, la domination des Thou khiouei a beaucoup altéré les mœurs et déplacé les peuples. Ce pays touche à l'ouest, à celui de Ke li se mo.

سمندر

SSE MO THU LO.—Semundus.—Edrisi, Vol. ii. p. 336. “De Babel Abwab, باب الابواب, Dur bund a Samandar, سمندر, on compte 4 Journées par un pays habité; et de Samandar a Athil, اثل 7 Journées,” “Samandar, مدينة سمندر, etait autrefois une ville importante et tres peuplée Fondée par Noucherewan, elle etait entourée de Jardins et d'innom-

brable vignobles : mais elle etait attaquée par une tribu de Rous قبیلة الروس, que s'en empara, et sa prospérité évanouit ; can this last sentence and "la domination des Thou Khiouee a beaucoup alteré les mœurs et déplacé les peuples," be the same ?

We know that the *Kubeelutal-roos* of those days, would have been considered Turks ; hence it is not a very presumptive question to ask, if the archetype of these two translations may not from the similarity of the translations, be almost pronounced identical. The description of Edrisi is itself a quotation. We have thus

Edrisi.

French Translation by Jaubert. Chinese Translation by the author  
of Hiuan-Thsang.

French retranslation by Klaproth  
and Landresse.

De là vers l'est 200 *li* à

129. *Po tho tsang na* (anciennement pays de Tou ho lo), 2000 *li* de tour. Le roi est fermement attaché à la croyance des trois Précieux.

مازندران

PO THO TSANGNA.—*Mazundurestan* ?

De là au sud-est, à 200 *li* au travers des montagnes,

130. *Yin po kian* (anciennement pays de Tou ho lo), 1000 *li* de tour. La langue est un peu différente de celle de *Po tho tsang na*.

ا ذر بالسان

YIN PO KIAN, is not so clear, unless we can establish the *zal*, ز, connected by its *damun*, with the *r*, and read *اير* ! Eu, the *r* dropt, or read *ون*, as we have remarked before of the *r*.

De là au sud-est, franchissant la chaîne par un chemin périlleux, à 300 *li*,

131. *Kiou lang nou* (anciennement pays de Tou ho lo), 2000 *li* de tour. Point de loi. Peu de Bouddhistes. Le peuple est sauvage et laid. Le roi croit aux trois Précieux.

کیلان چیلان

KIOULANG NOU.—*Geelan* ?

De là au nord-est, gravissant les montagnes par une route difficile, à 500 *li*,



132. *Tha mo si thiei ti*, ou *Thian pin*, ou Hou mi (anciennement pays de Tou ho lo), 15 ou 1600 *li* de l'est à l'ouest, 4 ou 5 *li* (*sic*) du sud au nord. Entre deux montagnes, sur le fleuve Fa tsou.

واغستان  
در بند

Les habitants ont des yeux verts, différents de ceux de tous les autres pays.

THA MO SI THI EI TO.—Daghestan ; we have already had غ gh transcribed as م m. *Thian pin* Durbund, pin beng bund as we remarked in Ghorbund ; Durbund lies on the west coast of the Caspian. The Arabic name being باب الابواب Babul abwab. Can some story of Green-eyes be traced to this country.

133. *Che khi ni* (2000 *li* de tour). La capitale s'appelle Wen ta to. Ce pays est au nord des grandes montagnes de Neige.

چرکس  
چرکز

CHE KHI NI.—Cherkes, or Cherkes, the modern Circassia. The r has been absorbed, and the final ze z read as before, nun ن n.

Julius Von Klaproth visited in 1808, the Tartar tribes lying on the borders of Russia. He found the Lamian religion to prevail among all of them ; the priests considering Tebut as the source of their creed—that intercourse was maintained with the parent country by missions.

He mentions also from an original Mongol work called the "Spring of the Heart," that the earliest traces of this Lamian religion among the Moguls are met with at the time of Zungees Khan, who sent for to his capital, the Lama high priest "to establish a system of religion and unite it with the monarchy," that the Moguls term this date the period of "the first respect for religion." The people of this country, called Circassians by nations of Europe, are named Tscherkessi by the Russians ; but denominate themselves Adegi ; the word Cherkeez is considered Tartar or Mongul, from Cher, a *road*, and Kez to cut!!! the people who held this position in the days of Strabo being called Zukoi. The result which I am compelled to adopt by my own readings and identifications is, that the introduction of the Arabic word قلع, Kulu for fort, in Kulu Sumungan : of the word Emam for Huzurut Emam, a place sacred to some Moslem saint, prove the names used in the Chinese original to be those of an age posterior to the Moslem

invasion of Affghanistan ; that if my identification of Utok, Shekar-poor and Buhawilpore stand the test of criticism, that the present nomenclature cannot claim for the work of the Chinese author, in its present form, an antiquity of one hundred years. I say in its present form, under the names now given to the world, by the French translators. Nay, some of the transcriptions are such as would almost warrant the supposition, of the presence of European Maps, as in the case of TCHI NA POUTI, for *Chinyout*. The bases of the work are in my opinion clearly Arabic and Persian Geographical publications, many of the words are literal transcripts from the Arabic ; and the similarity between the two French translations given under the head of Sumandur, almost warrant the assertion that the Arabic of Edrissi, or perhaps a step higher, his authority, have not been absent. Many a literary position has been established on weaker evidence. Such being facts, we may suppose for the sake of argument two or three modes, in which the present work has been got up.

There may have existed old travels of this Hiuan Thsang either in books or in popular tradition ; which some learned Chinese author may have modernized by the introducing the present names of places, drawn from Tibetan sources as regards the confines of that country ; or from Persian and Arabic works, as relating to districts more removed from this centre of the Lamian religion ; thus finding local habitations and names for various adventures and miracles of the sainted Superiors of his creed.

Or, like the Abbé Barthélemy, some talented scholar of the Chinese empire may have embodied the results of many years of study and reading in the travels of a fancied Hiuan Thsang, as the “ Voyage du Jeune Anacharsis Chinois,” tracing out the travels not of one Lama, “ Asoka,” but of many members of this religion, so as to bring within its scope and reach, nearly all the portions of Asia, in which this religion ever had footing.

Or the whole of it may be a modern compilation of some book-maker, with Geographical information for its end, while the various religious anecdotes have been introduced as relief to a dry discourse. The spoliation of western Asia, the plunder of the celebrated libraries of Bokhara, Sumurkund and Baghdad, by the Mogul armies under Zungees Khan and his sons, must have carried to China numerous valuable

Persian and Arabic works, whence much of this information may have been obtained. These books may have been read by Molás of Kashgar or any other Moslem province of China.

But above all, we must not forget the information which may have been imported to the learned of the celestial empire by the Jesuit Missions of the 16th, 17th and 18th centuries. Nay, much earlier; for, from the travels of Marco Polo, and from the Persian histories of Monka Khan, we know that Europeans had great influence in China, at a much earlier age; we all understand that the Jesuit Missions always considered instruction as one of their most powerful means. The followers of Loyola improved the Chinese Almanacs, and hence it may be inferred were not entirely neglectful of the sister science of Geography. Nor should we forget the connection even now existing with Russia. With these sources of information open we need not be so much astonished at the identifications which are here discovered. I am inclined to give a very recent date to the whole compilation.\*

I would remark, that particulars appear more minute round Kabul, as a centre; that the distances and directions are utterly worthless, being the combined results of misreadings, misunderstandings and guess work. Meridians of Latitude and Longitude have been followed in some instances, routes of marches and caravans in others, that the places are less distinctly delineated as more distant from Kabul; that the points of the compass have been strangely perverted, often reversed. The Chinese measure of Li may be taken in gross measurements as  $\frac{1}{3}$  of a mile.

The Geographical work of Edrisi was compiled H. 548, A. D. 1154, for Roger king of Naples and Sicily.—By Abou Abdallah, Mohummud-bin Mohummud el Edrisi; from numerous older books, chiefly Arabic.

The Sadek Esfuhanee, is a Geographical table of Latitudes and Longitudes translated for the Oriental Translation; Fund but the errors are endless, the Latitudes and Longitudes being copied with no attention to their correctness; in other respects the work is useful. Of the author few particulars are known, except that he lived about A. D. 1635.

The Ayeen Akbaree is the great work of the celebrated Abul Fuzl, one of the Ministers of Akbar, emperor of Hindoostan. The work

\* The great geographical compilation entitled *Pian i tian*, is quite a modern work we believe. We are happy to learn by a letter from Col. Sykes, that the whole is about to be translated from the Chinese by a young French savant.—Eds.

was translated by Gladwin in a mode, considering the age and the limited knowledge of Persian which then prevailed, that reflects much credit on the translator. But it is a work which if several manuscripts could be obtained would well repay a modern translation. The original work was finished of the close at the 15th century.

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*A couple of hours' Herborization at Aden. By M. P. Edgeworth,
Esq. C. S.*

On my way back to India I touched at Aden in October 1846, and while the steamer was coaling was able to make a short herborization in the little ravine behind the hotel and on the very bare rocky sides of the hill adjoining. As very little seems to be known regarding the flora of this *terrestrial paradise*, I think that the results of my two hours' stroll may prove not uninteresting, as there are some curious forms and new genera and species to be noted among the few flowers I collected.* The soil in which I found them was gravelly or rocky, the rocks all of volcanic origin. Of several species, which I believe I have identified with the description given in De Candolles Prodrumus, I subjoin more detailed characters.

Capparidææ,	6	Boraginææ,	1
Polygalææ,	1	Scrophularinææ,	3
Resedacææ,	1	Acanthacææ,	1
Zygophyllacææ,	1	Salvadoracææ,	1
Leguminosææ,	6	Plumbaginææ,	1
Ficoideææ,	1	Nyctagineææ,	1
Paronychieææ,	1	Chenopodiaceææ,	1
Cucurbitacææ,	1	Euphorbiacææ,	4
Rubiaceææ,	2	Graminæææ,	3
Compositææ,	2	Cyperacæææ,	2
Asclepiadæææ,	1		—
Convolvulacæææ,	1		Total,.. 42

Capparidææ.

CLEOME DROSERIFOLIA, De C. No. 23, p. 239, to which description may be added—

* It is probable that most of these plants are to be found in the collection made by M. Botta, but I have only seen the first part of the description of that collection, consisting only of Algæ.

Petala 4, basi squamâ cupuliformi nectariferâ instructa rubiscentia extus glandulosa, 2 majora. Stam. 4; Stigma tubulosum roseum, Sepala subæqualia. Flores axillares solitaires. Siliquæ ellipticæ acutæ (nec oblongæ ut in D. C.) Semina glabra; variat petiolis longioribus, foliis minus hirsutis, petalisque tantum 2 majoribus nectariferis.

CLEOME GRACILIS, nov. sp: herbacea, erecta, rigide ramosa strigoso-hirsuta, foliis alternis, suboppositisve breviter petiolatis late cordato-ovatis, orbiculatisve strigosis, racemis terminalibus aphyllis, floribus gracile pedicellatis, sepalis 4, subæqualibus acutis glandulosis, petalis 4, cruciatis venosis lilacinis. Stam. didynamis siliquis sessilibus filiformibus erectis, seminibus glabris. Habitu floribusque lilacinis cruciatis cardaminem mentiat, ideo C. scaposæ affinis?

CLEOME RUTA, Jacquemont—De Caisue p. 19, t. 19.

This I believe to be identical with *C. brachycarpa*, D. C. (*Ornithopoides*, Forsk.) The description given by Forskahl is perfectly similar; except that the old shoots do not become glabrous; I only hesitate to name it so, as I presume that M. DeCaisne had the opportunity of comparing Jacquemont's specimens with original ones of Vahl or Forskahl. The Aden plant is certainly identical with that from the Sutlej, with which I have compared it.

CLEOME MURICATA.—Erecta glabra apice glandulis nigris punctata, foliis longe petiolatis palmatim 5-7-natis petiolis *muricatis* foliolis petiolulatis linearibus utrinque acutis apiculatis glaucis glabris, racemis terminalibus thyrsoideis, sepalis glandulosis, petalis unilateralibus, duobus (inferioribus) duplo majoribus longe unguiculatis 2 ovalibus ungue brevi tubuloso nectarifero. Stam. 6 didynamis, stigmatibus sepili tubuloso extus annulo glandularum purpureo instructo legumine stipitato (stipite pedicello paullo brevior) longo tereti acuminato polyspermo, seminibus globosis *tomentosis*.

This appears to differ from Forskahl's No. 120, *C. angustifolia* in the downy seeds. And the leaves which could scarcely be termed *filiform*. Can it be *C. paradoxa*?

The flowers are very handsome deep, yellow veined with orange as large as and rather resembling *Cassia sophera*.

CADABA MONOPETALA.—Suffruticosa ramosissima ramulis junioribus pilosis demum glabris tentibus, foliis subrotundis basi subcordatis scabris margine et petiolo hispidis, floribus axillaribus solitariis longe

pedunculatis, sepalis inæqualibus glanduloso—pilosus 2 planiusculis, 2 concavis, petalo unico albido longe unguiculato ungue tubuloso nectarifero limbo ovato. Stam. 5 breviter monadelphis inæqualibus 2 minoribus, 2 majoribus 1 maximo, ovario longe stipitato stigmate sepili capsulâ stipitatâ setis clavatis hispida.

An *C. glandulosa*, Forsk. ? differt petalo unico nec nullo.

CAPPARIS UNCINATA.—Nov. spec: fruticosa glaberrima, stipulis 2 spinosis uncinatis, foliis petiolatis crassis ovatis (directione *obliquis*) acutis apice *spinoso-uncinatis*, pedunculis solitaris 1-floris folio multo longioribus, sepalis saccatis, petalis 4, albis, 2 inferioribus dolabriformibus intus lanatis 2 superioribus subrotundis glabris, stam. numerosissimis antheris albidis, thecophoro fructifero pedunculo longiore, fructum cylindraceum longum, semina numerosissima.

An *C. ægyptiaca*, D. C. ? at videtur "foliis uncinato-spinosis" diversa. Flores magni speciosi albi.

Resedaceæ.

Resedæ species foliis grassiusculis suffrutescens.

Having no book referring to the Resedaceæ, I refrain from inserting any details.

Polygaleæ.

POLYGALA ARABICA, nov. spec. (Sect. III. Blepharidium, D. C. p. 826) ; omnino pilis sursim adpressis incana, foliis alternis brevissime petiolatis ellipticis obtusis, racemis pauce floris, alis oblique obovatis obtusis pubescentibus, capsulam inæqualiter obcordatam *marginatam* ciliatam, seminibus longe pilosis.

An *P. erioptera* ? at foliis nec glabris nec acutis-valde affinis *P. serpyllifoliæ* differt capsulâ *marginatâ*, pilis etiam seminis longioribus.

Carina cristata rosea. Seminis canniculo basi piloso stipitato, arillus 3-partitus seminis basim paullo superans segmento uno angustiore longiore. In *P. serpyllifolio* pilis seminibus fuscent, in *P. Bothiand* semen multo grossius pilis brevioribus tegitur, stipiti omnino arillâ abscondito.

Zygophylleæ.

FAGONIA ARABICA.—D. C.

This answers the description fully, and is quite identical with the species so common near the Sotlej, which I believed to be *F. Myso-rensis*, but the spines are smooth, not hispid as described in that

species. Lieut. Munro, in his catalogue of plants growing near Agra, states *Mysorensis* to be identical with *Arabica*, and he probably had specimens from the peninsula as well as the Sutlej. This plant varies both at Aden and in Hindustan in having either simple or ternate leaves, which vitiates the sectional character given by De Candolle.

LEGUMINOSÆ PAPILIONACEÆ. SPARSIMUM MONOSPERMUM.

Nov. genus. *CATACLINE*.—Calyx ebracteatus subbilabiatus $\frac{2}{3}$ segmentis acuminatis inferioribus paulo longioribus. Vexilla dorso carinata emarginata oblonga. Alæ oblongæ auricula ad carinam dorso fissam coalitæ. Stamina ad medium monadelphæ 1-9, novem $\frac{5}{4}$ coalita, parte libera tenui, antheræ ovalæ consimiles, ovarium 1-spermum. Stylus glaber post anthesin tortus. Stigma capitatum pilis deflexis longe barbatis. Legumen stipitatum subinflatum dorso rectum antice gibbosum apice attenuatum 1-spermum, semen ovali-oblongo compressum olivaceum.

CATACLINE SERICEA.—Suffrutex sericeo-incana, foliis 2-4, jugis cum impari prope duplo-majore, foliolis anguste obovatis ellipticisve obtusis mucronulatis utrimque incano, serucies pilis adpressis subtus nervosis, racemis oppositifoliis umcinalibusve elongatis, floribus solitariis geminisve inferioribus folio depauperato bracteatis, calyce sericeo, vexille extus sericea purpureâ, ovario hirsuto, leguminibus in rachim declinatis.

I suspect that this belongs to Boissy's genus *Pognostigma*, quoted in Walters report, II. p. 856. But not having any means of referring to his work I cannot be sure, meanwhile I have given the above provisional generic character and name on account of its declinate fruit. It is allied to *Tephrosia* in habit, but the stamens and legume are very different.

TAVERNIERA GLAUCA.—Glaberrima foliis unifoliatis camosis glabris glaucis rhomboideo—ovatis suborbiculatis vemucronatis, stipulis 2, parvis scariosis cuneatis acutis, racemis 5-10, floris bracteis pedicello brevioribus acutis margine membranaceis, staminibus apice geniculatis alternis brevioribus decimo recto multo brevioribus geniculam vix attingente, legumine 2-articulato setis introrsum arcuatis hispido.

Next to *T. lappacea*, D. C. II. p. 339, differs in smoothness and the setæ of the legume are scarcely hamose; the stamens are more

geniculate than is allowed in the generic character as given by D. C. The pods are concealed by the withered scarious persistent petals.

Vexilla magna concava per anthesin reflexa subcarinata breviter emarginata et calloso—mucronulata. Alæ angustæ falcatæ ellipticæ basi truncato auriculatæ ungue brevi tenui vexillo plus duplo brevioris. Carina vexillo major obtusa, stylus longus basi tortuoso-geniculatus filiformis, stigmatibus punctiformi apicali.

MIMOSEÆ.

Benth. in Hook. Fl. Ind.

ACACIA ERIOLOBA? Spinis rectis geminis, foliis tomentosis bipinnatis 3-jugis primæ 8-10-foliolatæ, capitulis globosis axillaribus, staminibus liberis, leguminibus ellipticis extus velutinis di-spinis subfartis.

There was also another species not in flower, perhaps *A. arabica*, and another which appeared to be *Prosopis spicigera*, but likewise not in flower.

Ficoideæ.

ORYGIA DECUMBENS, D. C. III. p. 455.

Paronychieæ.

Nov. Genus. CERATONYCHIA.—Calyx 5-phyllus sepalis inæqualibus ellipticis plus minus carinatis carinâ in aristam brevem producta, margine scarioso apicem versus laciniato-ciliato, duobus multo majoribus cetera amplectentibus. Petala 5-lineari—hyalina, stamina 5-submodelfa, filamentis basi dilatatis, linearibus planis apice attenuatis, antheris 5 albidis ovatis. Stylus longus apice 3-dentatus, dente nudis brevior, stigma, unilaterale. Caryopsis 1-spermis semen basi fixum erectum orthotropum pyriforme. Embryo erecta cotyledonibus planis ovatis, albumine paucis laterali.

Herba erecta dichotomè ramosissima, annua.

C. nidus. Ramis tentibus, pilis brevibus deorsum scabris, foliis cruciatim verticellatis subsessilibus ellipticis utrinque acutis apice mucronatis glabriusculis margine scabrillis, stipulis connatis setosis, floribus ternis sessilibus, involucris subspinosis—hispidis ramosis post anthesin valde auctis, seminis testâ rugoso—striatâ eleganter glandulis brunneis punctata.

This curious looking plant, which looks like a bird's nest with its mass of branched involucres, differs from the section *acanthonychia*, of Paronychia, in 2 not 3 of the sepals being exterior and armed. The

shape of the stigma and the stipules seems to differ sufficiently from *Paronychia* to warrant placing it in a new genus; perhaps it should rather be considered as a subgenus.

Cucurbitaceæ.

A species resembling the *Colocynth*, but the specimens were mislaid.

Rubiaceæ.

KOHAUTIA GRANDIFLORA, D. C.

Hedyotis Sp? glanduloso scabra, foliis linearibus acutis margine revolutis, stipulis connatis setaceis ramis tentibus prostratis, floribus 4-meris antheris erectis.

As in every specimen I found the ovary had changed into a bud and in several sprouted into a young shoot, I cannot speak with precision as to its Genus.

Compositæ Semoniaciæ.

VEMONIA CANA—(*Lepidaploa*,) suffruticosa ramosa omnino pilis densissimis deorsim adpressis incana, foliis petiolatis variis obovatis, p spathulatis rhomboideisve integris dentatis obtusis acutisve, paniculâ dichotome fastigiata subscorpoidea demum subcorymbosâ, capitulis pedicellatis sessilibusve 10-floris bractea parvula instructis, involucri squamis exterioribus brevibus omnibus dorso histellis margine scariosis acutis (nec acuminatis) in fructu erectis nec revolutis, uninerviis, corollis glabris, pappo duplici setiformi, serie exteriori multoties brevior achenio sub-tereti, costis 5, pilosis, valliculis glanduloso—punctatis.

I observed likewise abundantly a very aromatic shrub, apparently a *Blumea*, but I lost the specimens.

Asclepiadeæ.

Glossonema Boveanum, D. C.

Convolvulaceæ.

One species, but I lost the specimen, it was a trailing plant, not twining.

Boragineæ—Heliotropiæ.

HELIOTROPIMUM PARVIFOLIUM, Nov. spec: (*Sect. Orthostachys*) strigosum pilis albis sursim adpressis foliis breviter petiolatis anguste ovatis ellipticisve obtusis margine revolutis spicis apice scorpoideis, bracteatis, bracteis a floribus dissitis eisve oppositis, calycis 5-partitis laciniis obtusis, corolla breviter tubulosa limbo plicato 5-dentato segmentis apice incrassatis margine undulatis, fauce intus annulo piloso

cincto, antheris hastatis acutis apice subglabris tamen cohærentibus, stylo brevi stigmate *umbraculi-formi* apiculato nuculis facillime separabilibus subtrigonis extus semi sphaericis adpresso hispidis lateribus planis 1 *foveolatis*.

Proximum videtur *H. bicolori*, differt floribus sessilibus nec pedicellatis et ab omni subgenere formâ stigmatis.

Scrophularineæ.

Linaria, probably *L. Hælava*, but I have lost the specimens.

ANTICHARIS ARABICA, Benth. in D. C. p. 347.

My specimens differ only in the leaves being ovate, or lanceolate, not linear-oblong, as there described.

CAMPYLANTHUS JUNCEUS.—Glaber, bracteis ciliatis, fauce corollæ tubo inferiori intus pilosis *antheris 1-ocularibus muticis*.

Suffrutex ramosus subaphyllus, folia parva subulata crassiuscule caduca. Racemi longi terminales. Corollæ limbi segmenta 2-superiora paullo minora æstivatione intima; filamenta mucronata cum connectivo sub-apice articulata, antheræ in alabastro etiam 1-loculares loculo aperto. Stylus complanato-dilatatus apice glanduloso, crenulato, stigmate unilaterali. Semina uniformia alâ membranaceâ *omnino* circumdata.

This curious looking shrub differs from the generic character as at present limited, in the form of the anther, but it seems otherwise so fully to correspond in habit with *Campylanthus* as to merit a place in the genus. Although *Anticharis* and *Doradantha* appear to differ exactly as this plant from *Campylanthus*.

Acanthaceæ.

ACANTHUS IMBRICATUS.—Prostratus, ramis tentibus albis, foliis brevi petiolatis ellipticis, spinuloso-dentatis obtusis acutisve suprascabris subtus incanis, bracteis numerosis *imbricatis* ovatis acuminatis spinosis nervosis exterioribus lepidotis, interioribus pubescentibus velutinis nervis pilosis, calyce piloso apice spinuloso, corolla extus deorsim adpresso puberulâ intus divaricatim pilosa, labio inferiore 3-lobo cæruleo, staminibus inferioribus longioribus supra connectivo longe cornuta, antheris per imparia oppositis dense ciliatis. Capsulam et semina non vidi.

I have named this provisionally, having no means of ascertaining whether it has been already described or not, pending the publication of the family in DeCandolles' *Prodromus*.

Plumbagineæ.

STATICE LANCEOLATA.—Ramis vaginis foliolorum persistentibus dense imbricatis foliis lineari—lanceolatis obtusis acutisve crassis glabris integerrimis in petiolum amplexicaulem longe attenuatis, paniculis axillaribus ramosis, floribus in ramulis ultimis sessilibus secundis, bracteis persistentibus externis ovatis, intimis subrotundis margine lato scarioso.

Named provisionally.

Nyctagineæ.

BOERHAAVIA *dichotoma*, Vahl? Panicula ramosissima aphylla pedicellis filiformibus, stam: 3, fructibus, 5 costatis, pyriformibus.

Euphorbiaceæ.

EUPHORBIA ARILLATA.—Glaberrima ramis prostratis, teretibus, foliis oppositis inæqualibus integerrimis breviter petiolatis lineari—oblongis obtusis mucronulatis, stipulis 2-setaceis, pedunculis axillaribus bracteatibus bifloris, bracteis petiolatis rotundis, involucri limbo 8-fido, segmentis 4 brevioribus ciliatis, 4 unguiculatis explanatis margine plano glandula oblonga medio compressa concava, fl: ♂ 1—6. Cum pedicellis abortivis linearibus scariosis barbatis intermistis, fl. ♀ 1, fructu nutante glabro, stylis 3-brevibus coccis 3-dorso acutis a basi facile dehiscentibus semine sub-oblongo angulato testa veteriore tenui, demum arilliformi lacera alba, interiore rubra.

This considerably resembles an Indian species, which I believe to be Roxburgh's *E. Chameasyce*, which has similar seeds, but in those I have examined the outer testa does not separate of itself in the elegant manner it does in my Aden plant. It likewise differs in the leaves being serrated near the apex. I should not however be indisposed to consider them only as varieties of the same form, and a further examination of Arabian specimens would be required to decide the point.

EUPHORBIA SYSTYLA.—Erecta glabra dichotoma, ramosa, foliis petiolatis angustis—ovatis vel lin-oblongis, inferioribus oppositis, superioribus alternis, capitulis axillaribus solitariis subsessilibus, involucri tubulosi segmentis 4-herbaceis obtusis pubescentibus, 4 stipitato glandulosis trapezioideis lateribus erosis, fl. ♂ 4-5, fertilibus et sterilibus pubescentibus, ♀ puberulo declinato, stylis 3 longe coalitis ad apicem tantum liberis, bifidis pilosis fructu *erecto* stipite cum involucrio circumscisso quasi annulato coccis dorso rotundatis puberulis, seminibus exarillatis

conicis compressis undulatis acutis testâ punctulata olivacea. Herba, 1-2-pedalis.

This species differs from all I know in its combined styles, and in the very peculiar form of the seed, which is difficult to describe, somewhat resembling a common wooden chess pawn much compressed.

EUPHORBIA FRUTICOSA.—Frutex ramosa erecta, ramis ramulisque *lignosis* siccis, angulatis puberulis, foliis subsessilibus obcuneatis retusis emarginatisve integerrimis pubescentibus, capitulis solitariis in apicem ramulorum sessilibus OO-floris ♂ numerosis ♀ unico toro clavato tomentoso.

This differs from all I am acquainted with in the hard woody texture of the branches, not spongy as in the other frutescent species. I did not see any ripe fruit. The branches are compressed somewhat as if pinched into their present shape. Beside these species there was a fleshy leafless thorny frutescent one like *E. antiquorum*, not in flower.

Gramina.

ARISTIDA—(Sub-genus *Stipagrostis*) **PARADISEA**, glabra, nodis glabris, vaginis arcte amplexi—caulibus striatis ore pauce barbato ligula ciliata—pilosa, lamina subulatâ convoluta, panicula strictiuscula, (1-2-pedali,) glumis glabris membranaceis acuminatis flore plus duplo longioribus (inferiore 8 lin: superiore 6 lin: longo) palea exteriore arcte convoluta, apice integro articulatim aristata, arista basi tortâ, 3 partita, ramis lateralibus brevibus setaceis medio longissimo plumoso basim versus nudiusculo, (3-4-pollicari, 6-9 lin:) palea interiore brevior ovata apice 3-dentata, lodiculis 2 hyalinis lanceolatis acutis, semine cylindraceo, callo pilis albis barbato obconico; stylis brevibus crebre plumosis.

I have named this *paradisea* from its resemblance to a plume of the bird of Paradise, not from its growing at Aden. It approaches *A. ciliata* and *A. lanata*, but differs in its smooth joints from the former, and smooth culms, &c. from the latter, and from both in the proportions of the awn, as given in Trinius and Ruprecht's elaborate exposition of the Stipacæ in the memoirs of the Petersburg academy, 1843.

Saccharum ? dissitiflorum, puberulum, ligula ciliato—barbata, panicula patente locustis omnibus *pedicellatis solitariis*, sericeo-pilosis, muticis.

Gramen tenerum 1-2-pedale, culmis tentibus, vaginisque striatis, puberulis, nodis pubescentibus, ligula ciliato—barbata folio supra piloso subtus

puberuli attenuato brevi, panicula erecta patente nodis pilosis ceterum glabris ramis ramosis ramulis pedunculisve brevibus flexuosis apice in receptaculum incrassatis, locustis solitariis bifloris, uno neutro altero ♂ ; in receptaculo stipitatis pilis sericeis glumis 3-plo longioribus, involucretis caducis, glumis 2 herbaceis ellipticis obtusis 2-5-nervis dorso longe sericeo pilosis, floris neutri palea unica hyalina apice ciliolata acuta, 2 nervia floris ♂ paleis lucidis acutis, exteriori alterum arcte involvente interioris marginibus hyalinis lodiculis minimis, stam 3, antheris fulvis, ovario compresso conico in stylum attenuato styli ramis apice fulvo—barbatis, achenio nigrescente.

This differs from all the true *Sacchara* in habit as well as having solitary not twin locustæ, it has much more the general appearance of some of the smaller species of *Raphis*.

ANDROPOGON ORTHOS (Schult and Kunth. p. 499.)

A. Strictus, Roxb.

My specimens are a little more glaucous than the Indian ones, but I can perceive no other difference.

Cyperaceæ.

CYPERUS EFFUSUS.—Kunth, p. 47.

CYPERUS JIMENICUS.—Kunth, p. 24.

*Inscription at Oomgá, and Notes on the same, by Capt. KITTOE,
6th Regt. N. I.*

In the August No. of the Journal of the Asiatic Society I gave an account of the temple of Oomgá and other objects in the vicinity : through the assistance of Heeranund Pundit of the Benares College, and of a clever young brahmun student Ramnath, I am now enabled to lay before my readers a Deva Nagree transcript of the inscription at that place, together with an abridged translation or summary, embodying the pith of the document, which (though little differing in style from others found in similar localities) is still not without interest ; for if we are to believe Bhyrub, Indra's poet Laureate, a brahmun by name Junardhun (whose verses are pronounced to be of a superior stamp and are certainly very florid), this chief and his predecessors must have been powerful. We have a long list of thirteen generations and the date of the last, Sumvut 1496, A. D. 1439, or 408 years ago, allowing

twelve years as the average of each of twelve reigns, we shall be carried back 144 years, or to the middle of the 13th century, the period when the Rajpoot chiefs of central India made their crusades against the Buddhists of Gaya. We may perhaps with propriety suppose that these Som or Chundra Vansa chiefs of Oomga Nugguri, as the place is termed, may have been on the crusade and usurped the power of the former rulers of the province, the Pal Rajas of Bengal, who I believe were of a different race—yet it is possible that the Oomga chiefs may have been themselves descendents of the Gour family, who were votaries of Kama Deva, for at Kooch near Gaya, is a fine temple, the real dedication of which is not known, built by this very Bhyrub Indra, where an image of Kama is to be seen. In Prinsep's tables we find a Kumara Pala Sumvut 1017, recorded in the Sarnath inscription, but this would give about forty years for each reign, which is too much; Kumara is made to be preceded by Bhoompal; the same name forms the first on Abul Fazil's list; our present list is as follows:

- | | |
|-----------------|---------------------|
| 1. Bhomipal, | 8. Mull Deva, |
| 2. Kumar Pal, | 9. Keisi Raj, |
| 3. Luchmun Pal, | 10. Bhur Sing Deva, |
| 4. Chundra Pal, | 11. Bhan Deva, |
| 5. Nain Pal, | 12. Som Eswur, |
| 6. Sundh Pal, | 13. Bhyrub Indra. |
| 7. Abhai Deva, | |

Buchanan, in describing Kooch, appears not to have done more than name Bhyrub Indra as the reputed founder, for I could learn nothing of him in Montgomery Martin's Compilation, perhaps when I shall have carefully examined all the inscriptions I collected at and around Gaya, I may find some further clue to the solution of the problem. The value of such records as these for historical purposes would seem to be greatly lessened through the absurdly florid and metaphorical style of writing. A petty lord may have thrown off allegiance to the sovereign Ruler (if there were such a person) and have gone on a plundering expedition; his cunning courtier draws up his pedigree and dubs him with the style and character of a mighty warrior, and lord of the universe, and perhaps gives him a new name possessed by some one of real renown. This leads to perplexity; for at this remote period who is there to decide which was "*this* McNab or the *other* McNab;" in illustration of this I

have made my translation sufficiently literal. The Inscription contains twenty-eight verses in all, twenty-two being in praise of Bhyrub Indra and his forefathers, each separately; five are composed of extracts from the Poorans, and one in praise of himself by the poet Janardhun, a brahman. The inscription opens with the praises and invocation to "Narain," the Supreme Being, after which follows the genealogical list; the pith of the story runs thus. Close to high hills is Oomga Nugguri, a place held for a countless period by the Sombunsi raja (Chandra Vansa). Of these I commence with Bhoompal, renowned of the Chhatri race, who made offerings to Siva of the heads of his enemies taken in battle; his son was named Kumara Pala who was like unto his namesake Kumara, son of Parbutti; his prosperity remained unshaken; his son was Luchmun Pal, whose rule was such as to remove poverty from the face of the kingdom; his son again was Chundra Pal, who exceeded his namesake the moon in purity, inasmuch as she has spots and he was spotless; it was his son Nain Pal, whose beauty exceeded that of Kama Deva, so much so that the nymphs of heaven came and wedded him; of him was born Sundh Pal, a great conqueror of his enemies; he was succeeded by his son Abhai Deva, who was the greatest of heroes; his son was named Mull Deva, whose fame was far spread; of him was Keisiraj, victorious over all other chiefs, and bountiful as the Kulpa tree; his son Bhan Deva, was powerful as his namesake the sun; Sôm Eswur, (a votary of Siva) was his son's name, a conqueror of his enemies, and was father to Bhyrub Indra, bountiful as the Kulpa tree, many and good have been the chiefs of the lunar line, but he was the greatest among them; he excelled them in good works; he was bestower of charity like the Kulpa tree; firm as Himmala's mounts, his speech was like unto that of Brishput, he was as beautiful as Kama Deva, and devout as the sage Bussisht; he was unsoiled with the vices of the Kali yug, he was learned in the law, renowned in the world, the bright moon of his race. Bhyrub Indra built a temple and set up the idols of Jugnath, Bulbudra and Subudra, in the Sumbut year 1496, on Thursday, the third day, in the light half of the month of Bysakh, in the Ruhenee Nukchuttra." Many were the idols he set up, and temples that he built, wells that he sunk and fine tanks that he excavated; he set up a fine pillar in the great tank; such were the works with which he adorned the country.

The verses go on with a prayer that the name and good works of the raja, and his genealogical tree, might endure through all ages. Then follow extracts from the Poorans, treating of the blessings accruing to those who performed good actions.

Whoso, say they, shall build a temple to Vishnoo, in any place, expiates all sins, even the greatest of all, that of killing a bráhmaṇ ; who-so buildeth a temple at a holy place of pilgrimage does even as much again ; he who builds on a hill realizes an hundred times the good, and whoso buildeth on a high peak a thousand. They who build temples to Vishnoo, of brick or stone, ensure not only expiation for themselves and their whole family for as many years as there are bricks or stones, but five thousand generations past and to come, and they will abide in heaven.

I think it will be admitted that the above is sufficiently florid, yet it records the building of the temple, which is no mean edifice, the pillar of which I gave a sketch, and the many small temples that crown every peak on the cluster of hills commanding the place ; the wells, the tanks, all exist ; so far the inscription is interesting, and it is one of few, if not a sole instance, of the name of the place being handed down unchanged to the present period, as well as the objects described. We are thus enabled to find the period of a particular style of building, which of itself is very useful in forming an estimate of the progress of Hindu architecture. We fix a date at which the worship of Jugnáth, Bulbudrá and Subudrá existed in Behár, at which also various other deities of the Hindu pantheon, were there worshipped or acknowledged ; and I should here observe a compilation containing all the inscriptions yet brought to light, and to which all that may be found should be added, would be of great value to the archæologist and historian, by enabling him at once to arrive at valuable conclusions ; and it must have been observed by those who have been at all engaged in such studies, that one inscription aids in the decyphering of another and in forming a connecting link in the chain of historical facts. In illustration of this I am tempted to offer an instance which though involved in doubt through the nearly illegible state of the inscription, still leaves a probability.

In an inscription found on a stone in the hills of Sirgoojoh, by Col.

Ouseley,* which I have before me, I find the name of a Raja Luchmun Deva, who, it would appear, fell in battle with some hill chief he had gone to attack. The lines which are so much worn, appear to read—“Son of Koomar Raja.” The date of this inscription is 1297, or 199 years earlier, which allowing an average of 22 years to each reign for the nine chiefs intervening, renders it not improbable that the two persons are one and the same, for the titles Pala and Deva, are of the same value; but these are mere suppositions which I offer as hints to other labourers in the same field, with which I must take leave of the present subject.

Inscription.

ॐ नमोनारायणाय ॥ तस्मै नमोस्तु हरये कमलाकटाक्षपीयूषसिक्त
वपुषे परुषेतराक्षाम् ॥ यश्चोत्थिताञ्जलिनिधेरवलोक्य लक्ष्मीं लक्ष्मीचकार
नसुरा न सुरान्विमुग्धः ॥ १ ॥ उमङ्गा नगरी गरीयसिगिरौगोर्वाण-
वन्दारकैः प्रासादेषु निवेशितैरतितरां धर्म्यान्धद्धिर्धुरम् ॥ तत्तत्सोम-
कुलोद्भवार्जिततमैः पुण्यैरगण्यैर्गुणैः प्रत्यक्षात्प्रतिवासरं प्रतिदिशं
पूर्णाद्भुतैर्भूरिभिः ॥ २ ॥ तस्यागण्यांविराजन्नयवतिरजनीनाथवंशेऽव-
तंसैराजन्यानामरीणां नयविनयगुणैर्दुर्दमोभूमिपालः ॥ चञ्चदोर्दण्ड-
लीलावलयितविनमच्चण्डकोदण्डकाण्डैरानर्चायं रिपूणां रणशिरसि
शिवां खण्डितैर्यग्निशरोभिः ॥ ३ ॥ कुमारपालः क्षितिप्रस्ततोऽभूत्कुमार-
तुल्यः प्रथितैकशक्तिः ॥ अवाप्ययं चारुगुणैररीणामुवास लोलापि चिरं
नृपश्रीः ॥ ४ ॥ जातस्ततो जगति लक्ष्मणपालनामा कामं कुमारकमनीय-
तनुर्महौजाः ॥ क्षीणं चकार चिरमुद्रितचित्रचित्रां यश्चार्थिस्वार्थरहितां
महितां नृवीर्यैः ॥ ५ ॥ कलङ्केन विना चन्द्रश्चन्द्रपालस्ततोऽभवत् ॥ यस्योद-
येऽरिवनिता चक्रवाकोव सीदति ॥ ६ ॥ तस्मादभून्नयनपाल इति प्रसिद्धः
सिद्धाङ्गनाख्यमुपेत्य पतिं चकार ॥ यं कान्तिकोत्तिपरिनिर्जितकाम-
देवं देवान्विहाय विरहार्त्तिभयप्रणुन्ना ॥ ७ ॥ तादायनिःसमभवद्भुविस-
णुपालः खण्डत्वमापुररयोभुवितेजसोऽस्य ॥ यश्चाजिसीमनि विभाव-
सुवासवादीं स्तत्तत्प्रभावनिचयैस्सदृशो चकार ॥ ८ ॥ अभयदेव इति
प्रथितौजसां प्रथम एव वभूव तदात्मजः ॥ समभिशासति यत्र नृपेभ्यं

* I avail myself of this opportunity of acknowledging Mr. Robert Neave's disclaimer which appeared in the *Calcutta Star*, of having taken any part in the defacing the Cufic inscriptions in the Temple of Oomga; it appears that the act was that of the Raja of Deo, at the suggestion of other parties.—M. K.

रिपुकुले वसतिस्म सतोऽभयम् ॥ ९ ॥ अभवदमलकोर्त्तिर्मल्लदेवोऽस्य
 सूनुः क्षितिपतिरतिशक्तिव्रीडितानेकवीरः ॥ जगतिविजययात्राभ्य-
 र्जिता यस्य भूयोगुणगरिमनिगीर्णा कर्णकोर्त्तिः प्रकीर्णा ॥ १० ॥ तादस्ततो
 नृपवरः किलकोषिराजो जज्ञे विजित्य विजयो सकलान् क्षितिशान् ॥
 पञ्चामरद्रुममुदारतरं विधाय धातान्य दाढरचनाविमुरवोबभूव ॥
 ११ ॥ तस्मादजायत नृपोवरसिंहदेवः सेवावनम्रधरणीपतिमौलिरत्नैः ॥
 भास्वद्विरर्चितपदस्य गुणातिरेकैरेकैव यस्य भुवि राजति कीर्त्तिवल्ली ॥
 १२ ॥ भानुदेवस्ततोजातः कराक्रान्तमहीतलः ॥ भानुमानिव विध्वस्त
 तमस्तोमः शुचिक्रियः ॥ १३ ॥ तस्माद्बभूवभवदत्तमनामनीषी सोमे-
 श्वरः क्षितिपतिः प्रथितः पृथिव्याम् ॥ यद्वीरवैरिवनिता विभवादधीरा
 दोस्तेजसः प्रतिदिशं सकृन्नावभूवुः ॥ १४ ॥ जित्वाजन्येसगर्वव्रजमकृत-
 धरां विप्रसाज्जामदग्न्यस्तामेतामस्य कीर्त्तिं ऋसयितुमखिलामानिनीषुः
 प्रतिष्ठाम् ॥ त्रैलोक्याधारमेकं प्रथितपृथुयशाः पार्थिवान् प्रोणयित्वा
 ब्रह्माण्डं भूरिखण्डं द्यदितवसुमतोनायसोमेश्वरोयः ॥ १५ ॥ तस्यात्मजो
 जगति जङ्गमपारिजातः श्रीभैरवेन्द्र नृपतिर्विजितारिवर्गः ॥ यस्य
 प्रतापतपनांशुभिराशुशेषमायान्ति वृद्धिसरितः प्रसभं रिपूणाम् ॥
 १६ ॥ सोमान्वये महतिभूरिगुणावदाताः क्षोणीभुजः कतिकतीह-
 नवावभूवुः ॥ आचारचारुचरितैस्तुकुलं सुधांशोः श्रीभैरवेन्द्रनृपति-
 र्विमलीकरोति ॥ १७ ॥ औदार्येण सुरद्रुमः स्थिरतयाहेमाचलोवारिधि
 र्गाम्भीर्येण च सूनूतेन वचसा वाचस्पतिर्मन्मथः ॥ सौन्दर्येण मतो वृद्धैः
 शुचितया ज्येष्ठा वशिष्ठादपि प्रायोयशुशुभकीर्त्तनो विजयते श्रीभैर-
 वेन्द्रो नृपः ॥ १८ ॥ बह्वितरणशीलः क्षातलेखेकवीरः कलिदुरित
 निहन्ता नीतिशास्त्राधिगन्ता ॥ मदनमधुरमूर्त्तिर्लोकविख्यातकीर्त्तिः
 स्वकुलजलधिचन्द्रो राजते भैरवेन्द्रः ॥ १९ ॥ जगन्नाथः सुभद्राच वल-
 रामः सुरत्रयम् ॥ भैरवेन्द्रोमहीपालः प्रतिष्ठापितवानिति ॥ २० ॥
 जातेतर्क ६ नवा ९ म्वधी ४ न्दुगुणिते सम्बत्सरेवैक्रमे वैशाखेगुरुवासरे
 सिततरे पक्षौटतीय तिथौ ॥ रोहिण्यां पुरुषोत्तमं हलभृतं भद्रां सुभद्रा
 न्तथा प्रत्यष्टापयदेकदैकविधिना श्रीभैरवेन्द्रो नृपः ॥ २१ ॥ गीर्वाण
 वृन्दनवगेहतङ्गायूपकूपैर्धरासुललितासमकारि येन ॥ वंशावलीवि-
 रचनं कृतमेतदास्तामास्तां सभैरवन्ृपोपिसमाः सहस्रम् ॥ २२ ॥ कृत्वा-
 पि पातकं धोरं ब्रह्महत्याधिकं नरः ॥ कारयित्वा हरेर्धामधूतपापोदिवं

ब्रजेत् ॥ २३ ॥ तीर्थेचायतनेपुण्येसिद्धक्षेत्रे तथाश्रमे ॥ कर्तुरायतनं
 विष्णोर्गोष्ठात्तन्निगुणं फलम् ॥ २४ ॥ फलं शतगुणं शैले यथोक्तात्परि-
 कीर्तितम् ॥ सहस्रगुणितं षडङ्गे कर्तुर्देवालयस्यच ॥ २५ ॥ इष्टका नि-
 चितं तिष्ठेद्यावदायतनं हरेः । कर्त्ताच सकुलस्तावद्विष्णुलोके महीयते ॥
 २६ ॥ समतीतं भविष्यच्च कुलानामयुतं नरः ॥ विष्णुलोकं नयत्याशु कार-
 यित्वाहरेर्गृहम् ॥ २७ ॥ अङ्गतोपिविक्रमाब्दाः ॥ १४६६ ॥ वैशाखसुदि
 तृतीयागुरो । भैरवेन्द्रप्रसादाप्तमहिम्नागमवेदिना ॥ जनार्दनेन क्षति-
 नाप्रतिष्ठाकारिताहरेः ॥ २८ ॥

*1.—Salutation be to that Hari, whose body is imbued with the ambrosia of Kamalá's glance, and who, bewildered at the sight of the ocean-sprung Lakshmi with her love-beaming eyes, looks not (even) at Devatás and Ashuras.

2.—The city of Ūmangá flourished on the top of a high mountain. Its houses were crowded with (the images of) mighty (1) gods; and it was ever adorned with the unprecedented virtues of the Soma dynasty.

3.—Here lived the wise king Durdama, of the moral race of the moon. He was a jewel among his rivals. Foremost in the field, he gratified jackals with the heads of his enemies, severed by the arrows of his strong and well-bent (2) bow.

4.—After him came Kumárapála, who was as powerful as Kártika. The unstable royalty of his rivals found in his merits a permanent habitation.

5.—After him, like another Kártika, came the mighty Lakshmanapála. He made the earth bear the stamp of his power, and freed it from indigence.

6.—Next, like a spotless moon, came Chandrapála, whose appearance caused the wives of his enemies to grieve like Chakravákies. (3)

7.—He was succeeded by Nayanapála, who surpassed Kámadeva in beauty. To avoid mourning for an absent lover, a demi-goddess, forsaking divine beings took him for a husband.

8.—* * * Sandhapála was born. He rendered his strength equal to that of Indra and the sun, and his majesty destroyed his enemies.

* We have substituted the present English version of the inscription, made by our talented young friend *Babú Rajendralál Mitra*, for that in Hindi, furnished by Capt. Kittere —Eds.

(1) *Lit.* "able to support heavy weights."

(2) *Lit.* "bent like an armlet."

(3) Bráhmíny ducks.

9.—His first born, Abhayadeva succeeded him. Wherever he reigned, he made fear take refuge in the family of his enemy, and confidence in that of the good.

10.—Of stainless deed was his son, king Malladeva. His excessive vigour shamed many a hero, and his renown surpassed the fame of Karna earned by many a victorious expedition.

11.—After him, king Kásirāja, having conquered all the kings of the earth, became invincible. Brahma created in him a *culpataru*, (4) and never attempted the like again.

12.—He was succeeded by his son Barasinha Deva. His feet glowed with the light of the crowned heads that were bent before them in submission, and his deeds were unrivalled.

13.—Next, Bhanudeva was born. He held the earth in his hands, and dispelled darkness like the sun.

14.—Next flourished the wise king Shomeshwara. His heart was given to Shiva, and the might of his arms bereaved the wives of his enemies of rest.

15.—With a view to establish his own reputation and eclipse that of Jamadagni, who destroying even unborn Kshetriyas, gave away the earth to bráhmanas, Shomeshwara the supporter of the world, satisfied the kings of the earth and (yet) gave away whole countries to bráhmanas.

16.—His son, king Bhairavendra was a conqueror of his enemies, and a *parijáta* (4) endowed with motion. The rays of his solar majesty dried up the understanding of his foes like water.

17.—Though many a king of untainted merit has appeared in the Soma dynasty, it is king Bhairavendra who has exalted it by his precepts and example.

18.—In charity he is deemed a *culpataru*, (4) in moral firmness the mountain Himálaya, in profoundness of thought the ocean; in veracity like Váchaspati; (5) like Kámadeva in beauty, and superior to Vasishta in piety—so reigns the renowned king Bhairavendra.

19.—The most charitable—the only hero on the face of the earth—the destroyer of the vices of the Kali yuga—the profound moralist—the Kámadeva-like beautiful—the illustrious—the jewel of his race—Bhairavendra reigns supreme.

(4) A fabulous tree; one granting every thing desired.

(5) A divine sage.

20.—The king Bhairavendra established the images of three gods, Jagannátha, Balaráma and Subhadrá.

21.—On Wednesday the third day of the dark lutation in the month of Vaisákha, in the year of Vicramáditya 1496, he established here, by one ritual, the images of Jagannátha, Balaráma and Subhadrá.

22.—He beautified the face of the earth by establishing images of gods, raising new buildings, and sinking tanks and wells.—May this genealogy last long ! and long live (6) the good king Bhairavendra !

23.—Whosoever buildeth a temple to Vishnu, expatiates all sins, even the greatest of all, that of killing bráhmanas ; and is translated to heaven.

24.—But whosoever buildeth a temple to Vishnu at a holy place, a place of pilgrimage, a sanctified spot, or an hermitage, acquires three times as much fruition.

25.—Building a temple to Vishnu on a hill secures a hundred times as much good, and on a high peak, a thousand.

26.—As long as a brick built temple of Vishnu lasts so long do the builder thereof and his family live in the heaven of Vishnu.

27.—Whosoever buildeth a temple to Hari translates five thousand of his generations past and to come to the heaven of Vishnu.

28.—On Wednesday, the third day of the dark lutation of Vaishákha, in the year of Vicramáditya 1496, Janárdana, who owed his greatness to Bhairavendra and was acquainted with the Vedas, officiated in the establishment of Hari.

Prashnotaramálá, or Catechetical Dialogue of Sook.—Translated by
J. CHRISTIAN, Esq., of Monghyr.

The reason for my translating this Catechism is, its preservation. There is nothing uncommon in it which would entitle it to regard. It contains (as almost all the writings of the Hindoos do) a mixture of mystic theology, and practical morality. It appears to be a work of modern date. Although ascribed to Sook, who was the son of the famous Byás, it is not sectarial, as reverence and worship in it is enjoined to the three hypostasis of the Hindoo trinity. The style of this little tract is uncommonly laconic. The date when it was composed is not known. It was given to me by Luchhmináth, (a famous

Gosain of Tirhoot,) to whom it was inscribed by the transcriber in 1762, year of Sák corresponding to 1840, A. D.

Salutation to Ganes.

1. Mercifully say O benign Gooroo! (1) where can I, who am sinking in the midst of the shoreless sea of the world, find a refuge? In the ample vessel of the lotus-feet of Biswes.

2. Who are the fettered? Those who are addicted to the enjoyments of the objects (2) of sense.

Who are the free? Those who discard the objects of sense.

What is the Terrific Hell? One's own body.

Which is the way to heaven? To conquer all desires.

3. Who has relinquished the World? He who has acquired a knowledge of his ownself according to the Veds, and this knowledge also confers beatification. (3)

Which is the door of hell? Woman.

Which is the way to heaven? Refrainment from the infliction of all kinds of injuries. (4)

4. Who sleeps in peace? He who is addicted to devout meditation.

Who is awake? He who discerns truth from falsehood.

Who are the enemies of man? His own unsubdued desires, and these when subdued become his friends.

5. Who is poor? He who is of vast desires.

(1) *Gooroo*. The Hindus have various sorts of Gooroos or teachers, such as the *Āchārj* आचार्य Gooroo, or he who instructs in the rites and ceremonies of religion, and also teaches the गायत्री, Muntra. Parents are also called Gooroos. These two sorts are the Mahá or chief Gooroos. Next to these is the Tántric Gooroo, तान्त्रिकगुरु, or he who instructs his pupil into the esotery of the Tantras.

(2) Objects of sense, विषय, are all those that are perceivable by the five senses.

(3) Beatification मोक्ष, or liberation of the soul from the body, and its exemption from further transmigration and consequent absorption into the essence of पुरुषोत्तम, or the great Being.

(4) Injuries are of three kinds, मानस, mental, वाचिक, verbal, and कायिक, personal.

Who is rich ? The contented.

Who living, is dead ? He who is without energy.

What is like death to a man ? Dependance on the vile.

6. What is Sin ?* Selfish pride.

What leads to folly ? The blandishments of the lotus-eyed fair.

Who is blind from his very birth ? (The sensualist.) He who is wounded by the God of love.

Who living, is dead ? The defamed.

7. Who is a Gooroo ? He who teaches what is good.

Who is a scholar ? He who is obedient to his Gooroo.

What is long-standing disease ? Friendship of the vicious.

And what is its antidote ? Friendship of the virtuous.

8. What is the most precious Jewel ? A virtuous disposition.

What is true pilgrimage ? The cleansing of one's heart.

What objects should be relinquished ? Gold and Woman.

What are to be continually cherished ? The word of the Gooroo, and of the Veds.

9. Which is the way to acquire a correct knowledge of Brahm ? The thorough knowledge of the Vedanta, according to the instructions of the Gooroo.

Who is a Devotee ? He who has relinquished all desires.

Who is void of desires ? He who is devoted to the acquirement of the knowledge of Sivá.

10. What is disease ? Anxiety.

Who is a fool ? He who is destitute of discernment.

What is desireable work ? Devotion to Sivá and Vishnool.

What is living ? Being free from defamation.

11. What is true science ? That which leads to the knowledge of Brahm.

What is wisdom ? That which teaches to discriminate between good and evil.

Which is the noblest acquisition ? The knowledge of one's self.

Who has conquered the world ? He who has gained a conquest over his ownself.

12. Who is bravest of the brave ? He who does not feel Cupid's shafts.

Who is truly learned ? He who is not entangled by woman's wiles.

* In some copies, "What is the cause of sin ?"—EDS.

13. Which is the most violent poison? The enjoyments of the objects of sense.

Who is perpetually unhappy? He who is under the influence of the objects of sense.

Who is blessed? The beneficent.

Who is venerable? He who possesses the knowledge of Vibhoo (the all-pervading being).

14. What does a learned man refrain from? From vicious company, from sin, and from covetousness. And what does he continually engage in? In religious studies.

Who is the origin of the world? Woman. (5)

15. Who is most cunning? Woman; whom even the fiends cannot deceive.

What are fetters to a man? Woman.

What is true penance? Making one's self independent.

16. What is undiscoverable? Woman's intentions and acts.

What is most reluctantly borne by all? Vile dependance.

Who is a brute? The ignorant.

17. With whom should not one dwell? With the ignorant—sinner, mean, and vile.

What are the requisites to one who is desirous of salvation? Society of the virtuous, and devotion to Rama.

18. What degrades one? The asking of alms.

What raises one? Independance.

Who is truly born? He who will not be born again.

And who is still born? He who is to be born again.

19. Who is dumb? He who does not seasonably speak to the purpose.

Who is deaf? He who does not listen to the truth.

Who is unworthy of confidence? Woman.

(5) The allusion of this is not clear. I should suppose it refers to the subject discussed in the *Brahmavai-varta Purán*, when it is stated that the plastic or creative power or energy being united to the passive cause, or मूलप्रकृति, (personified as a female, or शक्ति,) brought forth the world.

20. What is truth? (6) The only true blissful being without duality. What is nobleness? A virtuous action.

What having performed, one cannot repent of? The worship of Siva and Krishna.

21. What are man's chief enemies? Lust, anger, falsehood, covetousness and ignorance.

What is unsatiable? Man's desires.

What is the principal cause of man's troubles? Pride of self.

22. What is a learned man's ornament? Virtue and love to all creatures.

What having relinquished, one enjoys peace? Woman.

What is true charity? That gift by which the recipient becomes fearless of others.

23. Who is subject to ruination? He who entertains vast desires.

Who enjoys perfect tranquillity? (7) The emancipated.

By what is one mostly distressed? By his own ignorance.

Who are to be venerated? Gooroos and holy men.

24. What should a man, at the point of death, diligently perform? Meditate with all his mind and strength on the lotus-feet of Moorári.

25. Who are thieves? One's own irregular desires.

Who are worthy to be talked to? Those who are proficient in the rules of society.

Who is one's mother? Liberal knowledge that confers blessings.

What, by imparting, increases? Learning.

26. Where is fear to be apprehended from? From the censures of men and from the wilderness of the world.

Who is a friend? He who helps in time of need.

Who are one's parents? Those who cherish and maintain him.

27. What cannot the learned acquire, being taught? The desirable knowledge of what confers true tranquillity and happiness.

In what does all the knowledge of the world consist? In knowing that all creatures are formed in the image of Brahm.

(6) Truth signifies the essence or the indivisible part of an entity, so Siva, whose essence is comprehended in *nonduality*, is Truth.

(7) Tranquillity, or peace of mind; not being subject to fear or extraneous distraction.

28. Who is a great brute? He who having fully learnt the Shástras, does not lead a virtuous life.

What is that poison which seems like nectar? Woman.

Who in the shape of friends, are enemies? One's offsprings.

29. What are as fleeting as the lightning? Wealth, youth and life.

What is desirable wealth? That which is bestowed on deserving objects.

What should one, even at the risk of life, refrain from committing? A foul act. And what *should* he do? Worship Siva.

30. What objects are difficult of acquisition? A true Gooroo; society of the good; the knowledge of Brahm, relinquishment of all worldly things, and the knowledge of Siva.

What is difficult to all men to conquer? Love.

31. What should one do? Love Moorári.

What should not one make his abiding place? The world, which is like the sea.

On what should one meditate night and day? On the vanities of the world and on the excellence of Siva.

32. By rehearsing or hearing these questions and answers, which is like a string of gems, joy will be diffused into the hearts of the wise as 'tis done by the hearing or rehearsing the delightful history of Krishna and Siva.

स्वस्ति श्रीपरमात्मा श्रीलक्ष्मीनाथप्रीतिरस्तु ॥

शुभं भवतु ॥

श्रीगणेशाय नमः ॥ अपारसंसारसमुद्रमध्ये संमज्जतोमे शरणं किमस्ति । गुरो दयालो ह्यपया वदैतद्विश्वेषपादांबुजदीर्घनौका ॥ १ ॥ वज्रोनुकोयोविषयानुरागी कोवा विमुक्तिर्विषये विरक्तिः । कोवास्ति घोरोनरकः स्वदेहस्तृष्णाक्षयः स्वर्गपदं किमस्ति ॥ २ ॥ संसारहृत्कः श्रुतिजात्मबोधः कोमोक्षहेतुः कथितः सख्य । द्वारं किमेकं नरकस्य नारी स्वर्गं पदं किं जगतामहिंसा ॥ ३ ॥ श्रुते सुखं कस्तु समाधिनिष्ठा-जागर्त्ति कोवा सदसदिवेकी । के शत्रवः सन्त्यजितेन्द्रियाणि तान्येव मित्राणि जितानि देहे ॥ ४ ॥ कोवा दारिद्र्योऽतिविशालदृष्टः श्रीमांश्च को

यस्य मनश्च तुल्यम् । जीवन्मृतः कस्तु निरुद्यमोयः कावा मृतिर्हीनजने
दुराशा ॥ ५ ॥ पापोस्ति कोयोममताभिमानः कोमोहहेतुः परमां-
जाक्षी । कोजन्मनान्धोमदनातुरोयो मृत्युश्च कोवाऽपयशः स्वकीयं ॥ ६ ॥
कोवा गुरुर्योहि हि तोपदेष्टा शिष्यश्च कोयोगुरुभक्तिपूर्णः । कोदोर्धरो-
गोऽसतएवसंगः किमौषधं साधुसमागमोहि ॥ ७ ॥ किं भूषणाभूषण-
मस्तिशीलं तोर्यं परं किं स्वमनोविशुद्धं । किमस्ति हेयं कनकं च कान्ता
सेयं सदा किं गुरुवेदवाक्यं ॥ ८ ॥ के हेतवो ब्रह्मगतौ सुसन्ति सत्संग-
वेदांतविचारविद्याः । के संतिसन्तोखिलवीतरागाः कोवा निरोहः
शिवतत्त्वनिष्ठः ॥ ९ ॥ कोवा ज्वरः प्राणभृतांहि चिन्ता मूर्खस्तु कोयस्तु
विवेकहीनः । कार्याप्रिया का शिवविष्णुभक्तिः किंजीवनं दोषविवर्जितं
यत् ॥ १० ॥ विद्याहि का ब्रह्ममतिप्रदा या बोधोहि कोयस्तु विवेकहेतुः ।
कोवाप्त आत्मावगमोहि योवै सर्वं जितं केन मनोहि येन ॥ ११ ॥
श्रृरान्महाश्रूरतमोहि कोवा मनोजबाणैर्यथितोनयस्तु । प्राज्ञोतिधो-
रश्च समस्ति कोवा प्राप्नो न मोहं ललनाकटाक्षैः ॥ १२ ॥ विषाद्विषं
किं विषयाः समस्ता दुःखी सदा को विषयानुरागी । धन्योस्ति कोयस्तु
परोपकारी कः पूजनीयो विभुतत्त्वदर्शी ॥ १३ ॥ सर्वास्वस्थास्वपि किं
न कार्यमसत्सभालोकनपापलोभं । कार्यं सदा किं पठनं स्वधर्मं संसार-
मूलं हि किमस्ति दारा ॥ १४ ॥ दक्षान्महादक्षतमोहि कोवा नार्थ्या
पिशाचा नहि वंचितोयः । का शृङ्खलाप्राणभृतांहि नारी दिव्यं व्रतं
किंच निरस्तदैव्यं ॥ १५ ॥ ज्ञातुं न सक्यं हि किमस्ति सर्वैर्योधिन्म-
नोयच्चरितं तदीयं । का दुस्त्र्यजा सर्वजनैर्दुराशा विद्याविहीनः पशु-
रस्ति कोवा ॥ १६ ॥ वासोनसंगः सहकैर्विधेयोमूर्खैश्च पापैश्च खलैश्च
नीचैः । मुमुक्षुणा किं त्वरितं विधेयं सत्संगतीरामपदस्तृतिश्च ॥ १७ ॥
सदा लघुत्वं च किमर्थितैव गुरुत्वमस्यैव विपर्ययोस्ति । जातोस्ति को-
यस्य पुनर्न जन्म मृतस्तु कोयस्तु पुनर्हि जातः ॥ १८ ॥ मूकश्च कोवा
वधिरश्च कोवा वक्तुं नयुक्तं समये समर्थः । तथ्यं सपथ्यं न शृणोति
वाक्यं विश्वासपात्रं न किमस्ति नारी ॥ १९ ॥ तत्त्वं किमेकं शिवम-
द्वितीयं किमुत्तमं सच्चरितं यदस्ति । किं कर्म कृत्वा नहि शोचनीयं
कामारिकं शारिसमर्चनार्थं ॥ २० ॥ शत्रोर्महाशत्रुतरोस्ति कोवा कामः
सकोपान्तलोभमोहः । न पूर्यते किं विषयैर्मनो यत्किं दुःखमूलं मम-
ताभिमानः ॥ २१ ॥ किं मण्डनं साक्षरतामुखस्य धर्मश्च गोभूतहितं

यदेव । त्यक्त्वा सुखं किं स्त्रियमेव सम्यक् दानं परं किं ह्यभयं जनेषु ॥
 २२ ॥ कस्यास्ति नाशो मनसो वितत्या क्व सर्वथा नास्ति भयं विमुक्तौ ।
 श्रुत्यं परं किं निजमूर्खतैव के के ह्युपास्या गुरवश्च संतः ॥ २३ ॥ उप-
 स्थिते प्राणहरे दृतांते किमाशुकार्यं सुधिया प्रयत्नात् । वाक्कायचित्तैः
 सुखदं यमग्न मुरारिपादावुजमेव चिंत्यं ॥ २४ ॥ के दस्यवः सन्ति
 कुवासनाख्याः संबोध्यते कः सदसि प्रविष्टः । मातेव कायासुखदा सुवि-
 द्या किमेधते दानवशात्सुविद्या ॥ २५ ॥ कुतोहि भीतिः सततं विधेया
 लोकापवादाद्भवकाननाच्च । कोवास्ति बंधुः पितरौ च कौवा विपत्सहायः
 परिपालकौ यौ ॥ २६ ॥ बुद्धानबोधं परिशिष्यते किं शिवं प्रशांतं सु-
 खबोधरूपं । ज्ञातेतु कस्मिन्विदितं जगत्यात्सर्वात्मके ब्रह्मणि पूर्णमूर्तौ ॥
 २७ ॥ पशोः पशुः को न करोति धर्ममधीयशास्त्राणि समर्थितोपि ।
 किं तद्विषं भाति सुधोपमं स्त्री के शत्रवो मित्रवदात्मजानि ॥ २८ ॥
 विद्युच्चलं किं धनयौवनायुर्धनं परं किंच सुपात्रदत्तं । कंठं गतैरप्यशु-
 भिर्न कार्यं किं किं विधेयं मनिषं शिवार्चा ॥ २९ ॥ किं दुर्लभं सद्गु-
 रस्ति लोके सत्संगतिर्ब्रह्मविचारणैव । त्यागोहि सर्वस्य शिवात्मबोधः
 कोदुर्जयः सर्वजनैर्मनोजः ॥ ३० ॥ किं कर्म यत्प्रीतिकरं मुरारेः क्वा
 स्थानकार्या सततं भवाब्धौ । अहर्निशं किं परिचिंतनीयं संसारमि-
 थात्वशिवात्मतत्वम् ॥ ३१ ॥ कंठं गतावा अवयं गतावा प्रश्नोत्तराख्या-
 मणिरत्नमाला । तनोति मोदं विदुषां सुरम्या रमेशगौरीशकथेव
 सद्यः ॥ ३२ ॥

इति श्रीशुकयतीन्द्रविरचिताप्रश्नोत्तरमाला समाप्ता ॥ स्वस्तिश्री
 शाके १७६२ चान्द्रादाषाढसप्तम्यां भौमेः श्रीवाग्भूषणशर्मणालिखित
 मिदं ॥ शुभं भवतु ॥

On the Aborigines of the sub-Himālayas.

To the Secretaries of the Asiatic Society of Bengal.

GENTLEMEN,—You are aware that I am preparing a series of detailed memoirs on the Aborigines of this frontier in its Mountains and its Tarai, and that in the preface to the first of these memoirs, now issuing from the press, I have stated the reasons which induce me to

think the subject requires and deserves to be treated with great care and equal amplitude. But, as this method of proceeding will necessarily entail much delay, I fancy that many of your readers, both in India and Europe, may be glad to receive in the meanwhile a more summary view of the affinities of these tribes as deduced from a tolerably copious comparison of their languages or dialects.

Accordingly, I have now the honour to submit such a comparative vocabulary of 12 of the dialects found in the eastern sub-Himálayas, inclusive, for comparison's sake, of the written as well as spoken language of Tibet, it being of much importance to give this language in both forms, 1st, because it is employed in the former state with many unuttered letters, and 2nd, because all the dialects or tongues with which it is to be compared exist only (with two exceptions*) in the latter, or unwritten and primitive state.

With regard to the English vocables selected, I have adopted those of Mr. Brown, in order to facilitate comparisons with the Indo-Chinese tongues, as exemplified by him; but, to his nouns substantive, I have added some pronouns, numerals, verbs, adverbs, prepositions, conjunctions, and adjectives, under the impression that nothing short of such a sample of each of the parts of speech could at all suffice for the attainment of the end in view. Geographically or topically, I have confined myself to the east of the river Káli or Ghagra, as well because the dialects prevailing to the westward of that river are for the most part extremely mixed, and indeed almost merged in the ordinary tongues of the plains of Hindustán, as also because I have no immediate access to the people of the west. The case is very different in the eastern sub-Himálayas, where I am domiciled, and where, as will be seen, the Indian Prakrits have hardly been able to make a single cognisable impression upon any of the numerous vernaculars of the people, with the sole exception of the Khas or Parbatia Bhasha, which as being a mongrel tongue, I have omitted. I have likewise, for the present, omitted some interesting tongues of a genuinely aboriginal character, which are spoken east of the Káli, either by certain forest tribes existing in scanty numbers, nearly in a state of nature, such as the Chépáng, Kúsúnda and Háýú, or by certain other peculiar and

* The exceptions are the Névári and Lepcha, which form the topic of my second Essay, now nearly ready.

quasi Helotic races, such as the Denwar, Dúrré and Brámhó, who cultivate those low valleys from which malaria drives the ordinary population. That ordinary population, exclusive of the now dominant Khas or Parbatias proper,* above alluded to, consists, between the Káli and the Dhansri, in Nepal, Sikim, and Bhútán, of 1st Cis-Himálayan Bhotias vel Tibetans, called Rongbo, Siéná or Káth Bhotia, Serpa, &c., 2nd, Súnwar, 3rd, Gúrúng, 4th, Magar, 5th, Múrmí, 6th, Néwar, 7th, Kiránti, 8th, Limbu vel Yak thumba, 9th, Lepcha, 10th Bhútánese or Lhopa vel Dúkpa.

I have enumerated the races as they occur, in tolerably regular series, from west to east, in given and definite locations of the old standing: but the first named are found pretty generally diffused throughout the whole extent, west and east, of my limits, though confined therein to the juxta-nivean tracts or Cachár region; whilst the participation of the Gúrúngs and Magars, as military tribes, in the recent political successes of the now dominant Khas, has spread them also, as peaceful settlers, in no scanty numbers, easterly and westerly, from the Káli to the Méchi. The rest of the tribes have a more restricted fatherland or janam bhúmi, and indeed the locale of the Magars and Gúrúngs, not a century back or before the conquests of the House of Gorkha, was similarly circumscribed; for, the proper habitat of these two tribes is to the west of the great valley, which tract again, (the valley) and its whole vicinity, is the region of the Múrmis and Newárs; whilst the districts east of the great valley, as far as Sikim, are the abode of the Kirantis and Limbús; as Sikim is that of the Lepchas; and Deva Dharma or Bhútán that of the Lhópas or Dúkpas, usually styled Bhútánese by us. These constitute, together with the Súnwárs, who again are mostly found west of the great valley and north of the Magars and Gúrúngs, near and among the Cisnivean† Bhotias, the principal Alpine tribes of the sub-Himálayas, between that western point (the Káli) where the aboriginal tongues are merged in the Prakrits, and that eastern limit (the Dhansri) where they pass or seem to pass into the monosyllabic tongues of races of presumed Indo-Chinese

* Parbatia, पर्वत्य, means Highlander, but this general sense of the word is restricted by invariable usage to the Khas.

† Bhotia is the Sanskrit, and Tibetan the Persian, name for the people who call themselves Bodpo, or native of Bod, a corruption possibly of the Sanskrit word Bhot.

origin. The sub-Himálayan races I have enumerated inhabit all the central and temperate parts of these mountains, the juxta nivean or northernmost tracts being left to the Rongbo vel Sérpá; and the southernmost parts as well as the low valleys of the interior and central region, being abandoned to the Dénwárs, Dúrrés and other malaria defying tribes which, for the present, I do not purpose to notice. The people under review therefore may be said to occupy a highly healthful climate, but one of exact temperatures as various as the several elevations (3 to 10,000 feet) of the ever varied surface; and which, though nowhere troubled with excessive heat,* is so by excessive moisture, and by the rank vegetation that moisture generates, with the aid of a deep fat soil, save in the Cachár or juxta nivean region, where the lower temperature and poorer scanter soil serve somewhat to break the prodigious transition from the thrice luxuriant sub-Himálayas to the thrice arid plains of Tibet.

That the sub-Himálayan races are all closely affiliated, and are all of Tibetan origin, are facts long ago indicated by me,† and which seem to result with sufficient evidence from the comparative vocabularies now furnished. But to it lingual evidence in a more ample form will however in due time be added, as well as the evidence deducible from the physical attributes and from the creeds, customs and legends of these races. It must suffice at present to observe that their legends indicate a transit of the Himálaya‡ from 35 to 45 generations back—

* In the great valley which has a very central position and a mean elevation of 4500 feet, the maximum of Farh. in the shade is 80°.

† Illustrations of the languages, &c. of Nepal and Tibet.

‡ The vast limitary range of snows to the North of India has been known in all ages by names derived entirely from Sanskrit, the Greeks and Romans neither coining fresh appellations nor translating the sense of the Sanskrit ones into their own tongues, but adopting almost unaltered the Sanskrit names they found. These are Hémáchal, Héma-achal, snowy mountain. Hémádri, Héma-adri, the same. Hémálaya, Héma-álaya, the place of snow. Hémódaya (unde Emodus) Héma-údaya, the source of snow, or place of appearance of snow, as Súryódaya is the place of appearance of the Sun, that is, the East. The following tables show first the relative heights of the 5 great Andean and Himálayan peaks, and second the position in physical Geography of the latter, which, it will be observed, stretch all along the vast length of this stupendous range.

ANDEAN PEAKS.		HEMALAYAN PEAKS.	
Sorato,.....	25,400	Nanda Devi vel Juhar vel Jawahir,.....	25,749
Illimani,.....	24,350	Dhavala giri,.....	27,060

say 1000 to 1300 years, and that I prefer the remoter period, because the transit was certainly made before the Tibetans had adopted from India the religion and literature of Buddhism, in the 7th and 8th centuries of our era. This fact is as clearly impressed upon the crude dialects and cruder religious tenets of the sub-Himálayans as their Tibetan origin is upon their peculiar forms and features, provided these points be investigated with the requisite care; for superficial attention is apt to rest solely upon the Lamaism recently as imperfectly imported among them, and upon the merely exceptional traits of the mixed and varying Tibetan physiognomy, which is likewise their's in all its original incongruity. That physiognomy exhibits no doubt, generally and normally, the Scythic or Mongolian type (Blumenbach) of human kind; but the type is much softened and modified, and even frequently passes into a near approach to the full Caucasian dignity and beauty of head and face, in the same perplexing manner that has been noticed in

Dexya Casada,..... ..	19,570	Gosainthán vel Dáyábang,.....	24,700
Descabesado,..... ..	21,100	Kanchan Jhinga,	24,000
Chimbarazo,..... ..	21,441	Chumalari,..... ..	26,000

N. B. Of the Hemalayan heights the 2 first are Webb and Herberts; the 2 last Captain Waugh's (not precisely fixed and verbally communicated); the 5th or Gosainthan, Colebrooke's.

HEMALAYAN PEAKS.

<i>Names.</i>	<i>Positions.</i>
Nanda Devi.	Alpine Gangetic basin (Bhagarati, Pinder, Kuphni.)
Dhavala Giri.	Alpine basin of Gandak, West end, Nar-raini.
Gosainthán.	{ Alpine basin of Ghandak, East end, Trí-sul.
	{ Alpine basin of Kosi, West end, Sun Kosi.
	{ Impends the high land between basins of Gandak and Kosi.
Kanchan Jhinga.	{ Alpine basin of Tishta, West end, Bomchú.
Chumalari	{ Alpine basin of Kosi, East end, Tamvar.
	{ Alpine basin of Tishta, East end, Painom-chú.

N. B. Chumalari is detached and stands on the plateau of Tibet. Its relation to the Sub-Hemalayan basins and water sheds is questionable, whether as stated above or as stated any way. And with regard to the other peaks it is observable generally that they do not so much impend the bosoms or centres of basins as their extremities, thus forming the water shed between 2 basins, as Gosainthan between the Gandaks (7) and the Kosis (7) and Kanchan between the Kosis and the Tishtas—feeders of each; for all the rivers exhibit radiations or Deltas in the Sub-Hemalayas, though single streams in the plains and the space radiated over forms in each case the basin.

regard to the other branches of the Allophylian tree,* though among the Cis or Trans-Himálayans there is never seen any greater advance towards the Teutonic blond complexion than such as consists in occasional ruddy moustaches and grey eyes among the men, and a good deal of occasional bloom upon the cheeks of the children and women. A pure white skin is unknown, and the tint is not much less decided than in the high caste Hindus; but *all* are of this pale brown or isabelline hue in Tibet and the sub-Himálayas, whilst the many in the plains of India are much darker.

Before concluding this notice of the Alpine Indian Aborigines, it may be as well to define summarily the limits and physical characters of their original and adopted abodes, or Tibet and the sub-Himálayas. Tibet is a truncated triangular plateau, stretching obliquely from south-east to north-west, between 28° and 36° of north latitude, and 72° and 102° of east longitude. It is cold and dry in the extreme, owing to its enormous elevation, averaging 10,000 feet above the sea, to the still vaster height of those snowy barriers which surround it on every side and which on the south reach 26,000 feet,† to an uncommon absence of rain and cloud, to the extreme rarification of its atmosphere, to its saline and sandy soil, and as a consequence of all these and a reciprocating cause too, to the excessive scantiness of its vegetation. It is bounded on the south by the Hemáchal, on the north by the Kuenlun, on the west by the Belúr, and on the east by the Péling—all for the most part perpetually snow-clad, and of which the very passes average 15,000 feet of elevation. Tibet is, for the most part, a plain and a single plain, but one extremely cut up by ravines, varied much by low bare hills, and partially divided in its length by several parallel ranges approaching the elevation of its barriers, and between the 3rd and 4th of which ranges stand its capitals of Lassa and Digarchi. These capitals are both in the central province of the Utsang;

* See Prichard, Vol. IV. pp. 323, 344, 356, and Humboldt's *Asie Centrale* 2. 62 and 133. Who could suppose the following description referred to a Scythic race? "*Gens albo colore est atque pulchritudine et forma insigne.*"

† The five giants of the Himálaya all approach to, and none surpass, this stupendous loftiness, for Chúmálári does not exceed 26,000. The others are Kanchan, Gosainthan, Dhawalagiri, and Juhar or Jowahir. Capt. Waugh has just determined Kanchan and Chúmálári.

all west of which, to the Belúr, composes the province of Nari, and all east of it, to the Peling, the province of Kham, provinces extending respectively to Túrán and to China. Tibet, however arid, is no where a desert,* and, however secluded, is on every side accessible; and hence it has formed in all ages the great overland route of trade, and may even be called the grand ethnic, as well as commercial, highway of mankind; its central position between China, India and Túrán having really rendered it such for ages, before and since the historic æra, despite its snowy girdle and its bleak aridity. Hence we learn the supreme importance of Tibet in every ethnological regard. Its maximum length is about 2000 and maximum breadth about 500, miles: the long sides of the triangle are towards India and little Bucharia: the short one, towards China; the truncated apex towards Túrán or Great Bucharia, where the Belur within the limits of Tibet has an extent of only one degree, or from 35° to 36° N. Lat.; whereas the base towards China, along the line of the Peling, reaches through 8 degrees, or from 28° to 36° N. Lat. Just beyond the latter point, in the north-east corner of Kham, is Siling or Tangut, the converging point of all the overland routes, and which I should prefer to include ethnologically within Tibet but for the high authority of Klaproth, who insists that we have here a distinct language and race, though certainly no such separating line in physical Geography,† Siling or Tangut being open to the plateau of Tibet as well as to those of little Bucharia and Songaria, though demarked from China both on the north and east by the Khilian and Peling respectively.

South of the whole of Tibet, as above defined, lie the sub-Himálayas, stretching from Gilgit to Brahmakúnd, with an average breadth of 100 miles, divided climatically into three pretty equal transversal regions, or the northern, the central and the southern, the first of which commences at the crest or spine of Hemáchal, and the last ends at the plains of Hindustan; the third lying between them, with the great valley of Nepal in its centre. The valley is of a lozenge shape,

* In the next plateau of high Asia, or that of little Bucharia, the vast desert of Coli or Gobi, which occupies the whole eastern half of that plateau, has ever formed, and still does, a most formidable obstruction to transit and traffic.

† It must be admitted however, that the Bayam Khar of Klaproth seems to divide Kham from Tangut. Klaproth cites Chinese geographers.

about 20 miles extreme length and breadth, cultivated highly throughout, and from 4200 to 4700 feet above the sea. The only other valley is that of Jumlá which is smaller and higher, yielding barley (*Hordeum celeste*) as the great valley, rice. The sub-Himálayas form a confused congeries of enormous mountains, the ranges of which cross each other in every direction, but still have a tendency to follow with their principal ridges the grand line of the snows, or a S. E. and N. W. diagonal between 2° and 35° . These mountains are exceedingly precipitous and have only narrow glens dividing their ridges, which are remarkable for continuity or the absence of chasm and rupture, and also for the deep bed of earth every where covering the rock and sustaining a matchless luxuriance of tree and herb vegetation, which is elicited in such profusion by innumerable springs, rills and rivers, and by the prevalence throughout all three regions of the tropical rains in all their steadiness and intensity. There are three or four small lakes in Kumaon situated near each other, and three or four more in Pókrá similarly juxtaposed. But in general the absence of lakes is a remarkable feature of the Sub-hemálayas at present, for anciently the great valleys of Cashmir and Nepál, with several others of inferior size, were in a lacustrine state. The great rivers descend from the snows in numerous feeders, which approach gradually and unite near the verge of the plains, thus forming a succession of deltoid basins, divided by the great snowy peaks as watersheds, thus—

Basins.

1. Alpine Gangetic basin.
2. Alpine Karnatic basin.
3. Alpine Gandacean basin.
4. Alpine Kosean basin.
5. Alpine Tishtan basin.

Peaks.

- Nanda Devi.
 Dhavalagiri.
 Gosainthan.
 Kanchanjhinga.
 Cholo (near Chumalari, which detached) standing on the plain of Tibet.

In the two first of these 5 regions, all of which are plainly indicated by the distribution of the waters, the people are mongrel and mixed, save in the north-west parts, where the Rongbo or Cis-Nivean Bhotias, the Garhwális and the inhabitants of Kanáver and Ilangrang are of Tibetan stock. The 3d, or Gandacean basin (Sapt Gandaki, in native topography, from the 7 chief feeders) is the seat of the Sun-

wárs, the Gúrúgs and the Magars. The 4th, or Kosean basin (Sapt Kousiki in native topography, after the 7 chief feeders) is the abode of the Kirántis and Limbús. The 5th or Tishtan basin, again is the fatherland of the Dijond maro and of the Plúh or Lhópá, that is Lepchas and Bhútaneſe. And, lastly, the high and level space—(a system of valleys around the great one, which is nearly 5000 feet above the sea)—between the basins of the Gandak and Kosi is the seat of the Néwárs and Múrmis. But observe that the terms level space and system of valleys, applied to this last tract, are merely relative, though as such significant, nor meant to be contradictory of what has been above remarked, more generally, as to the whole Sub-hemálayas. And here I should add that the best representation of the Hemálayas and Sub-hemálayas is by a comparison with the skeleton of the human frame, in which the former are analogous to the spine, and the latter to the ribs. The Sub-hemálayas therefore are transverse rather than parallel ridges, as above stated, and they trend diagonally towards union on the verge of the plains, so as to unitise the several great streams, but still with an irregularity which close observance of the aqueous system can alone reveal. The ruggedness of the surface, by preventing all inter-communication of a free kind, has multiplied dialects: the rank pasture, by its ill effect on herds and flocks, has turned the people's attention more exclusively than in Tibet to agriculture, though even in Tibet the people are mostly non-nomadic;* heat and moisture, such as Tibet is utterly void of, have relaxed the tone of the muscles and deepened the hue of the skin, making the people rice-eaters and growers rather than carnivorous tenders of flocks. Thus the Cis-Himálayans are smaller, less muscular and less fair than the Trans-Himálayans; but the differences are by no means so marked as might have been expected; and though there are noticeable shades of distinction in this respect between the several tribes of the Cis-Himálayans, as well as between most of them and the Tibetans, yet if they all be (as surely they are) of the same origin, it must be allowed that very striking differences of climate

* Within the limits of Tibet are found abundance of Nomades of Mongol and Turkish race, called respectively Sokpo and Hor by the Tibetans, who themselves seem much affined to the latter race, which has long exercised a paramount influence in Tibet: witness the facts that all its hill ranges are Taghs, and all its Lakes, Núrs, both Türk words.

and of habits, operating through 40 to 50 generations, (far so far back I confidently place the migration) can produce no oblitative effects upon the essential and distinctive signs of race. But this is, in part, speculation, and I will terminate it by remarking that, for the reasons above given, my investigations have been limited to that portion of the sub-Himálayas which lies between the Káli and the Dhansri, or say, $80\frac{1}{2}^{\circ}$ to $92\frac{1}{2}^{\circ}$ of east longitude, and $26\frac{1}{2}^{\circ}$ to $30\frac{1}{2}^{\circ}$ of north latitude.

B. H. HODGSON.

Darjeling, Nov. 1847.

by B. H. HODGSON, Esq. B. C. S.

English.	Tibetan, written.	Tibetan, spoken.	Sanskrit.	Bhútáns or Lhópa.	Lepcha.	Limbú.	Kiránti.	M	N	Gurúng.	Magar.	Shan.
Air	rLungma	Lhok	Lungbo	Lung	Sung	Sammit	Hak	Uha		Nang mro	Nu	Phaw
Ant	Uchaba	Tamas	Lamas	Kasa	Lama	Sikchemba	Sakka	Sagat		Chigi	Mhar	Nagmachu
Arrow	Dhok	Da	Dha	Da	Da	Tong	Me	Uha		Mya	Ma	Ja
Bird	Jha	Ja	Jha	Bhyá	Ja	Ja	Chongwa	Sagat		Nemyá	Ja	Chiva
Blood	Khag	Thak	Thak	Thyak	Thak	Makhi	Hak	Kha		Koh	Ja	Ja
Boat	Ga	Kóá, Syün	Thú	Drú To	Nu	Khombu	Nu	Dagat		Pava	Ja	Ja
Bone	Gasa	Ru	Rubá	Rutok	Arh	Sayet	Su	Nu		Nugri	Maya ro	Ja
Buffalo	Mi	Mab	Mashu	Mahi	Mat	Sawet	Sawet	Mah		Mai	Laime	Nu
Cat	Dyok	Simi	Simi	Pili*	Alu	Myóng	Myo	Uha		Nawár	Suthu	Ja
Cow	Lama	Pamuk	Chak	Gat	Chak	Hat	Pa	M		Mysu	Nu	Ja
Crocodile	Kashu	Ablak	Chak	Ok	Alak	Ahwá	Kashu	Kashu		Mu	Ja	Kashu
Day	Namro	Nyimo	Su	Nyu	Saku	Léudik	L	Dma		Dma	Ja	Nathu
Deer	Kashu	Uyá	K	K	Kashu	K	K	Sagat		Khi ch	Nu	Kashu
Elephant	Sa	Amchó	Sa	Nu	Nu	Nekho	Nu	Nu		Nhai pong	Nu	Nu
Eye	rNa	Sa	Sa	Sa	Sa	Kham	Pa	S		Sa, Nho	Ja	Nophá
Fire	Sungá	Góng ná	Chak	Gong	Alu	Thin	Udaga	Thum		Phung	Ja	Phu
Elephant	gLangchen	Lámorhé	Lang	Lángchen	Lam	Hetti	Hu	Hathi		Hathi	Ja	So dá
Eye	Mig	Mik	Mik	Mido	Alu	Mik	Mik	Mi		Mi	Mi	Mi
Father	Phu	Pala	Alu	Alu	Alu	Amha	J	Alu		Alu	Ja	Bave
Fire	Mi	Me	Mi	Mi	Mi	Me	Mi	Mi		Me	Nu	Mi
Fish	Nu	Gau	Gau	Gnyá	Gau	Gau	Gau	Tár nyá		Nyá	Ja	Gau
Flower	Mu	Mu	Mu	Montog	Lam	Phung	Bungwai	M		Swong	Ja	Phu
Foot	Khag	Kashu	Kashu	Kanglep	Kashu	Lungdapphé	Lkhur	Ja		Phu	Ja	Kawéu
Goat	Ka	Ka	Ka	Rab	Su	Munda	Chengar	Ja		Chole	Ja	Charye
Hair	Khag	Ta, Kru	L	K	Alu	Thagi	Mo	Ka		Song	Ja	Chung
Hand	Lam	Lam	Lam	Lam	Kashu	Haktuphé	Kashu	Y		Pa lahá	Ja	Tablé, Gwí
Head	Ga	Ga	Ga	Ga	Alu	Lam	Tang	Ja		Chhop	K	Pty
Hog	Lam	Lam	Lam	Lam	Alu	Phu	Bhag	Ja		Phu	W	Phu
Horn	Ru	Rajo	Arkas	R	Arkas	Lam	Uha	Alu		Nu	Alu	Gáru
Horse	rPa	Tu	Lu	Tu	Lu	O	Ghota	Lu		Su	Ghota	Ghona
House	Khyam	Nu	Kashu	K	L	L	Kham	Phu		Phu	Ja	Kha
Iron	lChags	Chaga	Chaga	Chaga	Chaga	Phenje	Phalam	Phu		Phu	Phu	Wa akhi
Leaf	Lómá	Homa	Hyómap	Su, P	Lop	Pella	Uha	Ja		Ja	Ja	Su
Light	Hud	Hu	Rhap, Ea	Ea, Dam	Aom, Achúr	O't, Thorú	Ulawu chám	Ja		Ja	Ja	Tyawongcho, Ráp,
Man	Mi	Mi	Mi	Mi	‡ Maro, Tagri	Yapui, Yembecha	Maná	Nu		Mano, § Mi jáng	M	Ja
Monkey	sPrébu	Tu	Rhu	f	Sabeu	Saba	Hulawá	Nu		Muko	Ja	M
Moon	Lava	Du	Gu	Dau	Lau	Lava	Lá dima	Lham	{ Two mila. Týú	Lam	Ja	Lam
Mother	Arka	Arka	Arka	Ar	Ar	Amma	Ma	Amma		Ar	M	Am
Mountain	Ru	Ka	Ka	Róng	Lam	Toksang	Bhar	Gung		Ka	Ja	Du
Mouth	Kha	Kha	Kha	Kha	Alu	Muta	Dóh	Sung		Sung	Ja	S
Mosquito	Snnbú, mChuringa	Snnbú, mChuringa	Deung	Z	Mang kóng	Lamjonkhi	Lam kha	Lam khutia		Phu	Lam khutia	Lam khutia
Name	Ming	Ming	Mi	Ming	Abriang	Mi	Nu	Mi		Nu	Mi	Nu
Night	mFhangpo	Chaga	Chaga	Phru, Nammo	Sanap	Kashu, S	Kashu	Kashu		Chaga	Nu	Nu
Oil	bBromar	Nu	Nu	Maka	Nu	Nu	Nu	Chu gú		Chung	Su	Gy

* P and mo, as post-fixes, for mas, et form.

† Bha the bull. Láng the cow. Gao = Bos, both sexes.

‡ Tagri mas. Týú fem.

§ M jang, vir. Mi-sa, mulier. Mano, like Maro, mankind, and so yapui, whilst Lam bi chu Menchima are man and woman.

English.	Tibetan, written.	Tibetan, spoken	Sipa	Bhūtāna or Lhōpa.	Lepcha.	Limbū.	Kirānte.	Murmi.	Neuar.	Gurung	Magar	Sargu
Pountain River Sail Sail	carel Pang po Lam Lam	carel Chungpō Lam Lam	Lānga si Hyūng Lam Chhū	Gaūlū Chhū kyong Lam Chhū	Kardūng Ongkyong Lam Vom	Lā seh' Chua. Wo-hong Lam Yum	Gauk s. Hong-kā Lam Yum	Moché Syōng Ghyam Cháchá	Mey Khus. Lam Chhi	Kala Khuong Kam Chachá	Mocha Khu Lam Chá	Mahā Lam Lam Yam
Sail Sail Sail Sail	Pagpa Nam khah Pam Karma	Pagpa Nam Dum Karma	Kop-pa Nam Dum Karima	Pāko, Kompo Nam Beu Kām	Athūn. Kómbó Ta lūng Beu Sahór	Hong. Sol Ta. Sol Dak Khesya	Thak. h. Nam Lam Sung	Di bhí Mu Pukuri Karchin	Sya. Ch. Sung Lam Naga	Dit Tundī. Mun Lam Pirā. Tārgya	Ch. Sung Lam Lam	Kam Sung Lam Sung
Sail Sail Sail	rDo Nyima sTag So	rDo Nyima Tuk So	Dum Nyima Juk So	Doh Nyim Táh Soh	Lóng Sachok Sathóng Aphó	Lung Nam Kam Him	Lung. ta Nam Kam Kam	Yumbá Dini Chyaa Swa	Lung Sung Dum Wam	Yama Dini Chyaa Swa	Lung Sung Him Sung	Lung Sung Lam Kam
Sail Sail Sail Sail	Yul tsho Ch. Lam	Shingdōng Thōng Chhū Thōma	Dum Yul Chhū Dum	Shing Kyong Chhū Kyú	Kūng Kyong Ong Buk	Sung Pamph. Chhū Kam	Sangtāng Tung Chhūwá Sa ki	Dum Nam Kam Lam	Sung Dum Lam Him	Sung Nam Kam Tung	Sung Lam Dum Sung	Ram Lam Lam Lam
Sail Sail Sail Sail	Sail Sail Sail Sail	Gaya Khe Kam Gānjo	Gum Khyo Khwo Sung	Gua Chhū Khó Gua chú	Go Hau Heu Kayú. Ká	Lam Kam Kam Yam	Anka Kam Meko Ankan	Gum Lam Gum Gum	J. Chhū Wam Lam	Gum Kam Lam Gum	Gum Sung Lam Kam	Gum Lam Lam Lam
Sail Sail Sail Sail	Khyod chag Khochig Sail Khyodkyi	Khenjo Khónjo Gua yi Khé yi	Kam Khworung Gua ti Khyó ti	Khá chá Khóug Gné gi Chhé gi	Háyú Hóyú Kaseusa Hadosa	Khenh' Klunchu Ingá in Kbene in	Khananin Moko cha Ang ko Am ko	Sail Lam Gum Lam	Chha ping Wo ping Jit {gú. mho.} Chhang-gú	Lam Lam Gum Kam	Nung kúrik Hos kúrik Gum Nuwo	Gum Lam Lam Lam
Sail Sail Sail Sail	Khyi. Khóhi Nachaggi Khyod chaggi Khochaggi	Kam Lam Kam Khonjo yi	Kam Khworati Khyérati Khworati	Kheu gi Gua chégi Kheu chégi Khong gi	Heusa Kayú pongsa Hayú pongsa Hoyú pongsa	Khúne in Anigen in Kheuib' in Klunchi in	Móso Ain ko Amno Mynacho. Moyo	Thé lá In ná An ná Lam	Waya-gú Jiping gú Chhaping gú Waping gú	Lam Gum Kam Lam	Ho chú Kan kúrikum Nang kúrikum A kúrikum.	Hareá ké. Mre ké Go an ké Gai an ké. In ké Hari an ké
Sail Sail Sail Sail	gChig gNyis Lam bZhi	Chik Nyis Sung Zhi	Chik Nyis Sung Zhi	Kat Nyet Sain Pha li	Kat Nyet Sain Pha li	Thot Nyetsh Syum sh Lé sh	Ektai Hasat Súmyá Layú	Gum Gum Sung Lam	Chhi Ni Sung P.	Kam Ni Sung P.	Kam Sung Sung Lam	Kam Lam Lam Lam
Sail Sail Sail Sail	Hna Drak Lam brGyud	Gum Lam Lam Gum	Gua Lam Lam Gye	Gua Dum Dán Gyé	Pha gnou Tarok Ka kyok Kakeu	Gua sh Tuk sh Nu sh Yet sh	Gua yá Lam Bhogya Reya	Gum Dum Lam Lam	Gua Kam Nim Lam	Gum Lam Lam Lam	Lam Lam Lam Lam	Gum Lam Lam Lam
Sail Sail Sail Sail	gGú bChú. Thamba Nyi shú Sail	Gum Chhū Sung Sung	Gum Chhū Nyi shú Sum chu	Gua Cha-tham Nyi sho. Khéchik Khé phédáni	Ka kyot Ka tí Khakát Khakátsa kati	Pháng sh Thu bong Ni bong Súm bong	Phángyá Kip carel carel	Kam Lam Lam Lam	Gum Sung Sung Sung	Kam Lam Lam Lam	Lam Lam Lam Lam	Gum Lam Lam Lam
Sail Sail Sail Sail	bZlabchú. Hua bchú br Gya thambá Kyi. Gi. Hi. Yi.	Hap chu Gum Gya. Gyá thambá Gi	Hap chu Gnap chú Gyá Ti	Kam Kam Kam Kam	Kha nyet Kha nyet sa ka tí Khá pha gnou Sa	Lé gip Gua gip Thu bong gip Lé. In	carel carel carel Wo	Bokal ubi Bokal ni shú chu Bokal gúa Lam	Sú sánho. Pi-yé Pi sánho. Gniaye Gún sánho. Sat chi Yá	carel carel carel Yé. Lá. Bo	Lam Lam Lam Lam	Kam Lam Lam Lam
Sail Sail Sail Sail	Lam. Tú. Dú. Ra. Sú. Lá Sail	Lam. Dine Né. Dine	Lam Né. Dine	Ló Nú. Lé cháté	Ká Rem Nan. Láng	Mo. Nin Nú. Manú	carel Danká	Dá Yanchú	Yáta Ni shyang. Ang. Yákén.	Dum Wájé	Kam Lam	Kam Lam
Sail, inst.	{ Kyi. Gis. S. His. } Yis.	{ Elongation of terminal vowel }	{ Elongation of terminal vowel }	Ki. Dá	Nan. Sa	Hé. Nu	Yá	Syé	Ang	Ji	Yé. Y	Mi

* Corruption merely of Súra.

† Mho mas et fām. Gu neuter. Jmho myself. Jigūmng good.

‡ Anuswar merely ञ, and for instr. and abl. nlike: also yaken which likewise expresses with or sáth, the Latin cum.

English	Tibetan, written.	Tibetan, spoken	Serpa	Bhutani or Lepcha.	Lepcha.	Lama	Kiranti.	Murmi.	Néwar.	Gurung.	Magar.	Sakicor
Weep	Ná. Shum.	Gnó	Gnó	Gnó	Rhiop	Hó	Khárá	Kráh	Khwo	Krót	Ma	Ma
Be silent	Kbrog	Chúma	Khara	Khá chúm.	Sakmá	Sa	Man chebda	Kú dyú	Sumá khá chó	Táya pún	Ma chak	Ma
Speak	brJod. Smró.	carel	carel	Lap	Lí	Par	carel	carel	Nava	carel	carel	carel
Come	Hóng, s Byon.	Syó	Syok	Syó	Dí	Phar	Báná	Khon. Jyan gou.	Wa	Kbó	Rú ní	Pha
Go	Sóng. Gro. Gyu.	Gyó	Gyok	Sóng	Nón	B g	Khárá	Nyú. Syé go.	Hon	Yad	Nú ní	I
Stand up	bChhar	Lóng	Lóng	Lóng	Lúk. Ding	Pos	Yewá lúnta	Rab	Dong	Radh	Sa	I
Sit down	bDug.	Dh	Dh	Deu	Gn. d.	Yong ne	Yongá	Ion	Phé tú	Tidh	Nú ná	I
Move, walk	...	Gyó	Dong	Dyú	Nón	F g	I	Brou	Nyá. Hún.	Yáy	Wá ná	I
Run	rGyúg	Gyúg. Chong.	Chong	Pán kyap	Deung	Lokté	I	Yár	I wa	Dhid	Yan	I
Give	Thong.	Phing	Phing	Náng	Bó	Piráng nó	Ph	Pin	Byú	I n	Lan	I
Take	bLan. Júng. Hen	Lung. Yú.	Lung	Lén	Lyó	Li	I	Thob	Ka	Kinú	I	I
Strike	bDún. rDeg.	Dung	Dung	Dúng	Bak	Hipté	Mu	Rob	Di	Tan	I	I
Kill	Shig. Sód. h'...	Sa	Sa	Séh	Sot	Séré	Sa	Sat	Sa	Thód. Sed.	Sa	Sa
Bring	...	Bá syó	Bá syó	Bá syó	Bú di	Phep pé	I	Bou	Ha ki	Póg	I	I
Take away	...	Bak sóng	Kbúe syop	Bak sóng	Bú nón	Téte	Ki	Por	Yenki	Buod	Yenki	I
Lift up. Raise	bDegs. Slon.	...	...	Thú	Chun	Pókhé	Kháyú	Páyó	Lhon. Bú.	Nod	Ba	Pha
Hear	sNyob.	...	...	Nyen	Nyen	Khepsé	Y nu	Gó	Sa	Théd	Thom	Sa
Understand	Nyan. gSon.	Nyen	Nyen	Som tang Noh.	Ching	Singante	Sin tú	Gó	Siki	Maru	Phero	carel
Tell, relate	bShód. bChhod	Láp. Chwé	Lap	I	Dan	Chekhe	Kháng mótú	Syát	Kon	Bid	Khángni	Den
Good	Bazang-po.	Yappo	Lou	I	Aryúm	Noh ba	Núhva	Jaba	Bhing	Saba	Gyéché	I
...	Nang-po	Dúkpó	Ma lému	...	Azyen	Phem ba	Auva	Ajaba	Ma bhing	A saba	...	Marin noso
...	Grang-po	Thawmo	Thyángmo	Khya mo	Ahyúm	Kesem ba	Keng yong.	Simba	Khwa won	Santa	Ring cho	Chi só
...	Tshá-po. Dró-po	Cháhó	Tenmo	Ten mo	Arbúm	Kego ba	Kúyóng	Lépá	Khwa	Kro ba	Khan cho.	Hoso
...	...	Zyembo	Zyenba	Mu cho bo	Areu	Kuich'la	Uchiva	Chinga	Kuchi	Amiya	Mibol	Chérin pla
...	Sonabo	Chémbo	Chobo	Chochopo	Atnyen	Kusongvá	Dau va	Mín ba	Nhun gá	Mixá	Micho	Mi só
...	...	Gáurmo	Gnormo	Gna mo	Akham	Kelimba	Lemko	Kéxé ba	Chaku	...	Jyú cho	Jiji
...	...	carel	...	...	...	Menlita mina	Súró	carel	Phaku	Soba	Thúp cho	Dú so
...	...	khá ko	...	...	...	Ke khik pa	Khakko	Kam ba	Kanyu	Kamba	Khá cho	Kaso
...	...	Jab	...	...	...	Nohva	Khánuhvo	Brot khába	Banla	Soba	Sbé chya	Ronso
Ugly	Dsesmo. sTugpo.	Men jébo	...	Málem	Maryúane	Phem bá	Kháng úvo	Brotá khaba.	Bamala	A sha	Má sécho	Marimoso
Straight	Midsesma	...	...	...	...	...	...	...	...	...	...	...
Crooked	Drampo	Thang bo	Tungo	Tháng bo	Náng	T	Udang twong tong	Thácho	Tapyong	Kyún	Dhing cho	Sa
Black	sGúrbó. Tudpo.	Kákpó	Kák lók	Tyokkú	Manáng	Kok tú	Udang ú twon tong	Kókteng	Kókteng	Kúding	Gám cho	I
White	Nagpo.	...	Nakpo	Nakpo	Anok	Kumaklá	...	Maang	Hakú	Mónggyá	Chik chi dancha	Ka
Red	dKarpo	Karpo	Karpo	...	...	Kúphóra	...	Tara	Tara	Turkyá	...	I
Green	sMukbo	Marpó	Marpó	...	...	Kuhella	...	Bala	Hyoun	Wólkyá	Gyá cho	I
Yellow	...	Númimo	Númimo	Nhyam bo	A heur	Léhla	Chak la	Pingai	Wa won	Urkyá	Phuphi dancha	I
Orange	Ringpo	Rimbu	Rimbu	Rím bú	Phung phong	Kemba	Mótá	Reng ba	Taba	Rhumba	I t cho	I
Purple	Thungpo	Thun bú	Thunbu	Thun bú	Arhen	Tángba	Dung tú	Túmba	Chibá	I	Tún cho	I
Blue	...	Thombo.	Thombo	Phémba. Tho.	Atho	Kemba	Kun ta	Nohba	Tadla	Núhba	Guáng cho	I
Brown	...	Mamo	Mamo	Mhamten. Mhou.	Amou	Tángba	Sim tá	Meba	Chingdi. Bágó.	Cheunbo	Tem cho	Hó cho
Pink	Chháng. Phra.	Chún chún	Tippé	Chung bo	Achim	Chúk pa	Uchú yáng	Jájá	Chigo	Chúmba	Mar cho	The baba
Grey	Chhéapo. sBombo	Bombo	Girba	Bambo	Atim	Yomba	Uto yáng	Gná yáng	Taugo	The bá	Kran cho	Kul rótu
Blackish	Lumpo	Rari	Gurmo	Gúnto yeupo.	Rer rérho	Kugak ma	Au bo	Rul to	Gúgu	Phal dong	Dallo	Kul kút
Square	Girub zhi	Thúzi	Tapebi	Dazhi yeupo.	Ton kyong phali	Koyok túve lish	Phéb dába. Lea kona.	...	Pekúng	Kona ph	Chou khá nya.	Chér pútya
Flat	...	carel	Lahib	Le blep.	Alep.	...	carel	carel	Pati	Phlchá	carel	carel
High	...	...	...	Sab them.	Asap.	...	...	...	...	...	...	...
Thin	rGyagpo	Thó thembo	Gyámo	Gyá mó	Asyúm	Meh'ru	Tok pán	Choba	Lhong	Choba	Dhésa	Dumso
Weariness	Srobbo. Ridpo	Mabo	Denma	Bvé kó	Achim	Yosbu	Yóm	Jeutpa	...	Jhón ba	Rúcho	Gyé so
Thirst	...	...	Yé ché	Thung chhé	Pel	Nama	Hótáng	Blap ch	...	...	Mhuncha	Dati
Hunger	sKóm	Kl akum	Kl akum	Khá kóm	Ungó	Wá mik ma	Wait má	Kwi phut	Phidang	Kwí phi	Dí róna	Pang dati
...	...	Tok	To kúng	To ki	Tidok Kridok.	Set lah ma	Sáa	...	Pitya	Phokré	Takro sa	Amaja

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR NOVEMBER, 1847.

Proceedings of a meeting held on the evening of Wednesday, the 3d November, 1847.

The Hon'ble Sir J. P. GRANT, in the chair.

The proceedings of the September meeting were read and adopted—and the accounts for September and October submitted as usual.

Lieut.-Col. Waugh, Surveyor General of India, was ballotted for and unanimously elected a member.

Captain Rogers, R. N., Superintendant of the Bengal Marine, was proposed for ballot at the December meeting.

Proposed by Dr. O'Shaughnessy, seconded by Col. Forbes.

The Nuwab Nazim of Murshedabad, having been proposed as an ordinary member by H. Torrens, Esq., seconded by J. W. Laidlay, Esq., was, on the recommendation of the Council unanimously elected an *Honorary* member of the Society.

Letters were read from J. S. Torrens, Esq. Midnapore, and Major Marshall, Calcutta, withdrawing their names from the list of members.

To the Secretary of the Asiatic Society.

SIR,—I beg to return the last Journal, and to withdraw my name from the Society, as I am going on leave for probably a considerable period.

Your Obedient Servant,

G. T. MARSHALL.

October 16th, 1847.

To the Secretary of the Asiatic Society, Calcutta.

DEAR SIR,—I have the pleasure to send you a cheque for Rs. 128, the amount of the demand against me for subscription to the Asiatic Society, as

mentioned in your letter of the 17th inst. I take this opportunity of withdrawing my name from the list of subscribers, wishing success to the institution.

I am,

Your's faithfully,

September 3d, 1847.

J. S. TORRENS.

Read letters from Mr. Secretary Bushby, Home Department, forwarding extracts from a memoir by Mr. Masters, on the Natural History of the Agami Hills, communicated through Major Jenkins.

From the under-Secretary to the Government of India with the Governor General, and from the Secretary to the Government of the North Western Provinces, sending in duplicate two reports from Lieutenants Keatinge and Evans, on passages accomplished on the Nerbudda river from Mundlaisur to Baroach.

From H. M. Elliott, Esq., announcing that Lieut. Strachey's memoir on the lake districts of Manasarowur has been placed in the hands of Mr. Batten of Almorah, to be forwarded to the Society.

From Capt. Thuillier, Officiating Deputy Surveyor General, enclosing the Meteorological Register kept at the Surveyor General's Office for October.

From Capt. Vicary, Subathoo, forwarding a memoir on the Botany of Sinde.

From Mr. Laidlay, enclosing 16 Rupees, a subscription by Dr. Campbell of Darjeeling, for the repairs of the monument of Sir W. Jones, the restoration of which the Secretary stated had been entrusted to Messrs. Sherriff and Co.

From Walter Elliot, Esq., Madras, sending a paper on the language of the Goands, and the identity of many of its terms with words now in use in the Telugu, Tamil and Canarese.

From Brigadier Stacy, commanding at Neemuch, forwarding a drawing by Lieut. Anley of a rare and very large grasshopper, and tendering his cordial co-operation with the labours of the Society.

From B. H. Hodgson, Esq., forwarding a list of coins, which are offered on sale, and which Mr. Hodgson can procure for the inspection of the Society.

Dorjiling, October 1st, 1847.

MY DEAR SIR,—The Society may possibly desire to purchase the coins of which I enclose the list. Let me know and I will procure inspection for you, if it may be.

GOLD COINS.

	<i>Date.</i>	<i>Weight.</i>
One of Alexander,	—	133 grains.
— Gold Mohur of Aurungzeb,	1704	
— Double Guinea of George 2d,	1738	
— Louis d'Or, Louis 15th,	1743	
— Napoleon d'Or,	1808	
— 7 Shilling piece, George 3d,	1797	
— of Ferdinand 6th, Spain,	1758	27 do.
— Catherine 2d,	1777	6 do.
— Albert and Elizabeth,	1627	54 do.
4 Madras Pagodas,		
3 Gold Rupees.		

SILVER COINS.

4 Old Roman,		
12 Old English from Edward 1st,		
13 Scottish,		
65 British, from James 1st to George 3d,	41 tolas.	
8 French, 4 of Napoleon,	11 do.	
1 Italian Napoleon, 5 Lire,		
20 Spanish, 1 Joseph,	13 do.	
5 Portuguese,		
2 American $\frac{1}{2}$ Dollars, 1795—1808,		
1 Pope Clemens 13th, 1761,		
6 Belgian,	5 $\frac{1}{2}$ do.	
2 Sicilian,	1 $\frac{1}{4}$ do.	
1 Burgundy, Brabant, 1618,	2 $\frac{1}{3}$ do.	
1 Brunswick,		
2 Russian, Cath. 2d,	2 $\frac{2}{3}$ do.	
5 Danish, from 1710 to 1808,	4 $\frac{1}{3}$ do.	
1 Jewish Shekel,	$\frac{6}{5}$ do.	
1 Charles 9th, 1607,		
16 Spanish, Prussian, Bavarian, American,		
7 Rupees of different Bundelcund states,		
5 Burmah Rupees.		

SILVER MEDALS.

Louis 14th,		
Charles 2d, (Restoration,) }		
Caroline, (Coronation) 1727, }	.....	6 $\frac{2}{3}$ do.

COPPER AND BRASS COINS.

Old Roman,	40	Bavarian,	1
Russian,	10	Danish,	1
Dutch,	18	Prussian,	1
French,	13	Austrian Maria Teresa,	1
Portuguese,	5	Chinese,	6
English, Scotch, Irish, Manx, ..	56	Acheen,	9
American,	4	Swedish, &c.	8
Spanish,	3	Unknown,	13
Indian,	15	European,	6

From B. H. Hodgson, Esq., regarding a donation of certain works he desires to forward to his Holiness the Pope.

W. B. O'SHAUGHNESSY, *Esq. Secretary, Asiatic Society, Calcutta.*

Dorjiling, 20th October, 1847.

SIR,—I am about to transmit to you a box containing forty-seven Volumes, as per accompanying list. These works were obtained by me from Lassa, through the kindness of the Chief Pontiff there, or grand Lama, and they are the whole remaining relics of the Library of the Tibetan Mission of the Propaganda at Rome. It is my wish that the books should be presented on my behalf to His Holiness the Pope, who is now gathering golden opinions throughout Europe by his sagacious and benevolent efforts for the regeneration of famous and beautiful Italy. The Society, or the Government, will, I feel assured, readily second my wishes by procuring the conveyance and presentation to be made in the most fitting and convenient manner, and upon that point I request you will be pleased to communicate with His Honor the President in Council. These books are all that could be obtained by earnest endeavours and inquiries; and, small as is their number, I believe that they will be acceptable on various accounts to His Holiness the Pope, and shall be delighted to hear that such has been the case. You are aware that the Church of Rome had formerly large and flourishing Missions in China, Tibet and Nepal. All went to utter ruin towards the close of the last century, when the few Christians belonging to the Nepalese Mission found refuge in Sarun. The works now forwarded are all that remains of the once flour-

ishing Mission in Tibet, whence the Missionaries were expelled by the Chinese into Nepal, and thence by the Gorkhas into Sarun.

I am, Sir,

Your obedient servant,

B. H. HODGSON.

List of books presented to His Holiness Pope Pius IX. by B. H. HODGSON, of the Bengal Civil Service, late British Minister at the Court of Nepal.

<i>Names of works.</i>	<i>Volumes.</i>
Martyrologium Romanum. Venice, 1738,	1
Storia della vita e del cultu Dis'Vincenzo Ferrerio. Rome, 1735, ..	1
Istoria di Maria Vergine. Naples, 1730,	1
Mistica Citta di Dio. Trent, 1731,	4
Collectanea Bullarii. Venice, 1640,	1
Norma Perfecti Episcopi. Komarck, 1719,	1
Ludolphi Vita Christi. Venice, 1637,	1
Scholastica Commentaria Thomæ Aquinatis. Venice, 1691,	1
Pandulphi Vita Gelasii II. Papæ. Rome, 1633,	1
Summa universalis Theologiæ composita a Cacciatureo Arachiel Armeno. Rome, 1726,	1
Nuovo Legendario della Vita di Maria Vergine, &c. Venice, 1645,	1
Vita del B. Giuseppe Da Leonessa. Genoa, 1695,	1
Hieronymi Cardani Somniorum Libri IV. Encomium Neronis, &c. &c. Basil, 1569,	1
Delle Glorie de Sagri Tempi, Tre Libri. Rome, 1734,	1
Logicæ Summula, authore Hieronymo de Angeli. Naples, 1693,	1
Francesco di Salazar's Considerations on the spiritual exercises of Loyola. Rome, 1737, 8 copies,	8
Dichiarazione di tutto cio che contiene la Religione Cristiana. Roma, 1738, 2 copies,	2
Vita Toribii Alphonsi. Batavia, 1670,	1
Bibliorum Sacrorum pars altera,	1
Rubricæ Generales Breviarii,	1
Repertorium Morale Authore R. P. Octavio Maria A. S. Joseph. Venice, 1706,	1
Institutiones Theologicæ ad usum Seminarii Pictaviensis. Pictav, 1727, ..	1
Meditazione del Lodovico da Ponte. Venice, 1719,	2
Catechismus Exdecreto Concilii Tridentini. Brixia, 1632,	1
Secretorum Agri Enchiridion autore Antonio Mizaldo. Lutetia, 1560, ..	1

Janua Grammaticæ auctor Francisco Latino et Nicolao Nerio. Rome, 1736,	1
Dell' Imitazione di Cristo di Tomaso de Kempis. Padua, 1713,	1
Le Directeur des Confesseurs par M. Bertant. Rouen, 1663,	1
Manuale Thomistarum Biterris Editio 4, Baptistæ Gonet, injured, and imperfect, 1681,	2
R. P. Thomæ Tamburini Opera Omnia. Venice, 1694,	1
Bartholomæ Medinæ in Aquinatis tertiam partem Expositio. Venice, 1590,	1
Del Mappa Mondo Istorico, Opera del Antonio Foresti. Venice, 1725, Incomplete,	3
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	Vols.... 47

(Signed) B. H. HODGSON.

Dorjiling, in Sikim, 20th Oct. 1847.

[Mr. Hodgson's communication was confided to the management of the Council of the Society who were requested to carry his wishes into effect.]

From M. P. Edgeworth, Esq., Umballah, forwarding a paper entitled, "Two hours' Herborization at Aden."

Banda, October 25th, 1847.

My DEAR SIR,—I have the pleasure to enclose a paper for the Journal upon the Aden Flora, such as I saw in a couple of hours scramble among the rocks there—although the flowers were not numerous yet their forms are curious, and as far as I am aware no notice has been published of the Aden Flora. M. Botta's collections may very likely have included some of what I suppose to be new, but as I have not any thing but the beginning of his work and no part of Boissy or Ancher on Oriental plants, I cannot be as sure of my ground as I could wish—still I do not think a possibility of that sort is a sufficient reason for my not giving to the public my observations for as much as they may be worth.

I am meditating an account of the Botanical results of an ascent of Parusnath, the high hill near the trunk road in the Behar or Ramgurh ranges—but I have but little time for such things—and have not all the works I require for the purpose, to do it as I should wish.

Your's very truly,

M. P. EDGEWORTH.

From Mr. Piddington, forwarding letters from Major Jenkins and Capt. S. Reynolds, with a description and drawing of the sculptured brass vessels used as a medium of exchange among the Garrow tribes.

MY DEAR PIDDINGTON,—I am not Archæologist enough to know if this account of the Garrow Korahs is of any interest, but the name itself may be new to you. A Korah or Corah is a brass basin, of which the enclosed paper gives you the depth and circumference.

It is rather a curious thing that these Corahs are the current coin of the Garrows, and here is paid fines and tributes in Corahs. We sell them at auction, and the Bengalis take them back again in the way of trade and so I suppose, they hover over these hills for ages. I did not know what Capt. Reynolds says that they were in demand on account of the value of the Brass, but this value perhaps attaches only to the Corahs of the days of old. At present new ones are I believe made in the Mymensing and Rungpore zillahs, and I suppose the brass is as bad as it can be.

The old Corahs must also be of Bengali manufacture, for the Garrows do not work in brass and not even in iron.

I enclose another bead in great demand amongst the Nagas. Is it Cornelian or glass? Can you tell me if such are procurable in Calcutta, and at what cost per 100.

Your's sincerely,

October 16th, 1847.

J. JENKINS.

Goalpara, August 22nd, 1847.

MY DEAR SIR,—I enclose a sketch made by Mr. Leslie, of the embossed figures and ornaments on a Garrow Korah or dish, which was brought in in a case of theft the other day, and as it appeared to me curious how these people have got hold of such things, I got Mr. Leslie to sketch it in order to send it you in hopes you would be able to procure information on this head.

The Garrows themselves do not know how their ancestors became possessed of these dishes, and state that they are heirlooms in their families, and are only used on grand occasions. The omlahs and others who I have spoken to say that they are of Bengalee manufacture, and that the Garrows in the first instance obtained these from them. If so what is the reason of the Bengalees anxiety to purchase these Garrow Korahs, as they *can* obtain, it may be supposed, as good in Bengal, but they are willing to give any price here for the Korahs to sell in Bengal.

The metal being pure and good the art must have become extinct amongst them and the purchase merely for the profit on the sale of the metal, or else the Korahs are the manufacture of other countries; my reason for supposing they are not Bengali is because the dishes are of an entirely different shape from those used by Bengalis, and when they repurchase them from the Garrows they do so merely for the profit on the metal. I am not acquainted sufficiently with the heathen mythology to know what the figures of the accompanying sketch denote, but they are beastly enough to belong to the Hindus. Are they Hieroglyphical? The dish from which this sketch was taken was of the circumference of the paper, and the figures are of the exact size each figure was in relief, rising above the side of the dish about half an inch.

My dear Sir,

Your's very sincerely,

S. REYNOLDS.

[A further notice on this subject will appear in a future number.]

From Capt. Kittoe, submitting copy and translation of inscription on the ruined temple of Oomga.

Note from Mr. Hodgson enclosing remarks on the Serica Regio of the ancient geographers.

Dorjiling, 31st August, 1847.

MY DEAR SIR,—The enclosed may perhaps appear to the Society of some little interest with reference to Messrs. Taylor's and Cunningham's recent remarks on the Serica Regio, or, at all events will serve to apprise the Society that I have not been neglectful of its wishes with regard to the Mission to Tibet, though I regret much that too late a notice and want of books, have prevented my doing so much as I would otherwise gladly have done.

Your's most truly,

B. H. HODGSON.

(Copy.)

Darjeeling, 31st August, 1847.

MY DEAR WAUGH,—Many thanks for the perusal of Lieut. Strachey's letter. I am sure he will answer your expectations from him. As you say, conjectural and historical geography, are poor things, after all; for geography is pre-eminently a matter of facts, and 'tis futile and wearisome to a degree to follow the philosophers who so dashingly substitute theory and conjecture in this field for things more solid, and alone admissible in our day of actual universal contact with those things. Nevertheless conjectural geography may be of high service in sharpening and

guiding the attention of him who has to traverse the regions speculated upon; and, from the perusal of Humboldt, Klaproth, Grosier, Remusat, Prichard, and from comparison of what they say with De Coros, Gerard and Moorcroft, I have *now* filled my head with matter for questioning, and much regret that I had not sufficient warning, so that what I wrote for you, six weeks ago, was the mere crumbs of memory. Still however I want Klaproth's *Carte de l'Asie Centrale* (Berlin, 1835) and Ritter and Mahlman's maps of yet later date, and therefore, though with every wish to be useful, I will write no more at present lest I should iterate, merely and clumsily, what Lt. Strachey will find in those, the last and best, guides, and because also one evil of this conjectural system of facts is that there is no getting one's say into moderate compass! I hope Lt. Strachey will be able to penetrate into central and eastern Tibet. If he could get in that direction, as far as Siling, and thence trace the boundary of China, and of Kham, as far as Assam, he might solve a world of most interesting geographic and ethnographic problems. Siling, I am sure, is the *Serica* regio of the Classics, said region including Tangut, Sifan, Kham, Shensi, Setchuen, in reality, and in the vague apprehension of that day extending to all the proximate parts which either furnished any portion of the things in commerce or lay in any of the routes of the traders, so that the sub-Himālayas on one side (including Assam), and Indo-China on the other, and Bishbalig on a third hand, all came to be comprised in the *Serica* vel *Sinica* regio, the nucleus of which certainly was Siling, though it might and did extend thence westward over little Bucharia. It would be a grand thing for geography (and ethnography) to make out the alleged differences and identities in regard to Tangut, Sifan and Kham; and to mark off their boundary towards China proper and little Bucharia and Mongolia; and to test the fact of a great transverse snowy range (Yun-ling, Pe-ling) answering on the east to the Beluttagh on the west, and forming, if it exist, the eastern term of High Asia, as Belut does the western; and to find out how it is that *with* such a meridional or vertical range forthcoming between these Chinese and Tibetan countries, nevertheless so many and such large rivers flow off from the latter, east and south, into China, and Indo-China, &c. &c. &c. Then again, in ethnography, the power of testing the meaning of the Tibetan "Hlor-Sok," precisely and accurately, by means of language and physical attributes,* and, by the same means, of marking off distinctly the Tibetan fixed and nomade races from the Chinese, and from the Scythic races (Turk, Mongol, Tongus) is a rare chance for this Mission,

* Sogdiana doubtless included the Bishbalig as well as Anderjan, Tashkand, Khajand, &c. et intra Imaum (adareton) the towns on either side having always been, and being still, inseparably blinded.

which I hope it will not neglect ; nor yet forget the immense interest attaching to the *ubi et quid* of the classic Sacæ and Indian Sákas, whose headquarters were, I am sure, the Sogdiana of the Classics, and whose existence *there* as a great people, so long ago as the 5th Century, B. C., is attested by their King's visit to Sákya at Cattuck, as is their contemporaneous existence as a great people throughout *Northern India* or the N. W. provinces, by all the records and events of Sákya's life, he having been himself of their blood and breed, and the Sákas and Sichivis, all his fellow-clansmen of the race of the Sacæ of Sogdiana, whose very name seems to survive in the Sok (pronounced Sog) of Tibet at this day, and also in the Soch or Yakuts of the Lena, a far-dissevered but true limb of the same mighty body which was famous ages before the Tartars and Mongols were heard of, and which has an intimate connexion with Indo-germanic History in the West and the East. Could we recover the clue to this race, it would be a brave event indeed.

Your's ever,

(Signed) B. H. HODGSON.

From Capt. Kittoe, offering his services to the Society as their Honorary agent at Benares ; advising the issue of a circular to Political officers, seeking information regarding the festivals held near their stations ; also an application to Government for free transit of sculptures in the river Steamers.

To the Secretaries, Asiatic Society.

Banares, 29th August, 1847.

DEAR GENTLEMEN,—I have the pleasure to forward a paper on the travels of Chi Fa Hian in the province of Behar with a description of the localities I lately had an opportunity of visiting, attempting to follow this clever and truthful Chinese priest's track. The subject being one of considerable importance in many points of view, I trust therefore it may prove acceptable.

2nd. I beg to suggest for the consideration of your Society, and of its Committee of papers, my proposal that a few copies of the Oriental works on hand should be sent to me for disposal (by sale) at this city ; the Sanskrit works in particular. I shall be happy to afford my assistance in this matter, which may better our funds.

3d. I propose that the Society should issue a circular letter to all public functionaries, and more particularly to Political Officers (who have generally more leisure) calling on them to collect notes on the different festivals held in or near their stations, stating the period of the year in which such are held, at what places, what day of and in what moon ; the length of time

continued, the nature of the rites and ceremonies, the castes most engaged in each, and any other information which intelligent persons will be so good as to collect. I have often reflected upon the usefulness of such information properly embodied and considered; by such we may be able to throw great light on the ancient religion of the country, and more particularly on the subject of Buddhism in its early form. Mr. Laidlay has kindly brought to my notice a very important fact described by Fa-Hian, viz. the existence of a "Rut jatra," or Car procession of the image of Budha, at the same period as that now observed for the Car of Jugnath, which fact adds weight to an opinion I have long held that both Jugnath and Somnath were originally Buddhist fanes. A great fair was held at Sarnath, last week, a place of known Buddhist origin, but the object worshipped is Maha Deva, which again adds weight to another opinion I have expressed on the possibility of that worship being also connected with Buddhism for as I have shown already, wherever Buddhist relics exist there also we find the emblem of Siva, or the male power.

4th. I request that your Society will apply to Government to allow sculptures and other objects worthy of a place in the Museums of Calcutta and the India House to be taken free of expense on board their river steamers. I for one am so situated that I could supply many very useful specimens. I have at present several very curious idols lately dug up, and many more would be supplied.

In conclusion, I beg to offer my services whilst at this place as agent on all matters of interest to the Society. I wish to further the views of my kind patron, our late lamented Secretary, James Prinsep, whose name is still mentioned with respect and affection at this seat of his first labours for the interest of our Society.

M. KITTOE.

The marks of the Society were voted to Capt. Kittoe for his obliging offer para. 2d and last, which was accepted; his suggestions in paras. 3d and 4th being referred to the Council for consideration.

From Baron Van Hammer Purgstall, transmitting a set of the Vienna Review for the last year.

From Dr. Julius Retzhold, Librarian to His Royal Highness the Prince John of Saxony, acknowledging with thanks the present from the Society, of Abdul Razzaq's Dictionary of the technical terms of the Sufees.

From Messrs. Allen and Co., London, dated 19th August, 1847, enclosing annual statement of account.

From Mr. Christian of Monghyr, presenting the Catechetical dialogues of Sook, Sanscrita, with English version.

Received through Mr. Blyth—

Meteorological Register for May, June, and July, 1846, kept at Kurachee, by Lieut. Blagrove.

Also, for exhibition, a specimen of Punjabee art, illustrative of the Ornithology of the country of the five rivers.

Communications were submitted from the Council of the Society—

1. Informing the Society that Mr. Muller, the accountant, having been compelled by ill-health to proceed to Darjeeling, they had selected Mr. Frederick Greenway to officiate in Mr. Muller's place. (Mr. Greenway is appointed to act for Mr. Muller as accountant to the Mint). Approved accordingly.

2. An opportunity occurring for procuring at cost price, the following valuable works :—

Dumas Chimie appliquée aux arts, 8 vols. with atlas.

Villefosse Richesse Minerale, with atlas.

Hassenfratz, Siderotechnie ; price for all Rs. 320.

The Council recommend their being purchased for the Library—agreed accordingly.

3. The Council submitted a letter from Mrs. Belnos, forwarding for the inspection, opinion and patronage of the Society, MS. and drawings, entitled “ Illustrations of the Sundhya, or daily prayers and poojahs of the Brahmins.”

The Council having referred the application to the examination of a Sub-committee, have received a report, in which the collection of drawings is described as curious and interesting,—the text well written—and if lithographed by able artists in Europe, and certain Anatomical defects in the drawings remedied, deserving the Society's patronage on the publication being completed. The Council propose that a communication to this effect be addressed to Mrs. Belnos. The Sub-committee and the Council further recommend the purchase for 100 Rs. of a copy of Mrs. Belnos' published work on the manners and costumes of the people of Hindustan.

The preceding proposals were unanimously adopted.

With reference to the objection made by a member lately elected to paying for the whole quarter, he having been elected in the last

month thereof, the Council propose, as a future rule without retrospective effect, that members only pay from the month in which they are elected—agreed unanimously.

5. The defaulters' list having been again under consideration of the Council by a vote of the September meeting, they propose—

That members in India defaulters for more than 12 months be struck off the list, after three months' notification being given—and that the names of members removed on this account be duly published in the Society's proceedings.

Unanimously agreed to, and it was further directed to discontinue sending the Journal till arrears be paid up.

6. The Council submitted a letter from Dr. Roer, presenting the portion of the Rig Veda he has already completed, including the text and two translations, prose and metrical. The Senior Secretary read the prose version of several hymns.

After the reading of the hymns, it was proposed by Col. Forbes, seconded by Mr. O'Dowda, and agreed, that the MS. and versions be referred to the Oriental Section for their report, and that the Assistant Secretary, Rajendra Lal Mittra, be elected a member of that Section.

Lastly, the council by advice of the Oriental Section, recommend the distribution of Dr. Hæberlin's Sanscrit Anthology according to the annexed list, which was handed in :—

1 The Honourable the Court of Directors,.....	25 copies.
2 His Royal Highness John Duke of Saxony,.....	1 copy.
3 The University of Oxford,	1 do.
4 Ditto Cambridge,	1 do.
5 Ditto Dublin,	1 do.
6 Ditto Christiania,	1 do.
7 The Royal Asiatic Society,	1 do.
8 The Asiatic Society of Paris,	1 do.
9 The Academy of Berlin,	1 do.
10 ——— München,.....	1 do.
11 ——— St. Petersburg,.....	1 do.
12 American Philosophical Society,.....	1 do.
13 Prof. H. H. Wilson,	1 do.
14 Dr. W. H. Mill,.....	1 do.
15 Sir J. Johnston,.....	1 do.
16 The Honourable G. Turner,	1 do.

17 Col. L. C. W. H. Sykes,	1 do.
18 Sir G. C. Haughton,.....	1 do.
19 M. E. Burnouf,	1 do.
20 M. P. E. Faucause, Paris,.....	1 do.
21 M. Langlois, Paris,	1 do.
22 Capt. Troyer, Paris,	1 do.
23 Baron Von Hammer Purgstall, Vienna	1 do.
24 Charles Lassen, Bonn,	1 do.
25 F. Bopp, Berlin,.....	1 do.
26 A. Ewald, Tübingen,.....	1 do.
27 F. Kúchert, Berlin,	1 do.
28 A. F. Pott, Halle,	1 do.
29 J. F. Grotefend, Hanover,	1 do.
30 J. Gildemeister, Bonn,.....	1 do.
31 H. Brockhous, Jena,.....	1 do.
32 Dr. Höfer, Berlin,.....	1 do.
33 F. Benary, Berlin,.....	1 do.
34—Bóethlinck,	1 do.
35—Gorresis, Turin,	1 do.
36 The Honourable Mr. Thomason,.....	1 do.
37 B. H. Hodgson, Fsq.	1 do.
38 Major G. Marshall,	1 do.
39 J. Muir, Esq.	1 do.
40—Trevor, Esq.....	1 do.
41 Raja Radakant Deb,	1 do.
42 Debendernath Tagore,	1 do.
43 Dr. J. Ballantyne,.....	1 do.
44 Bombay Branch Asiatic Society,.....	1 do.
45 Madras Literary Society,.....	1 do.

Report of the Curator, Museum of Economic Geology, for the months of September and October.

From W. C. Thorburn, Esq., we have received several cannon and swivel balls of a fine grained granite (almost a micaceous sandstone) from a hill fort near Dhontola-Kooda-Ghat Purgunna, in the district of Gowalpara.

From Major Jenkins we have received eight specimens of Marbles, Serpentine, Jasper, Basanite, &c., some of which are of great beauty, and nearly all good additions to our cabinets in both departments.

In reference to them Major Jenkins remarks that at a future time may find employment for a large body of workmen in converting them into ornamental

articles, as is now done with serpentines of the Lizard, which many of them very exactly resemble. And it was only recently discovered that the Cornish Stones were of any value.

That gentleman has also forwarded to us additional specimens of the Deo Monnee beads, of which some are distinctly enough nothing more than blue and green beads and bugles, and the red ones evidently artificial. In a subsequent letter Major Jenkins sends one of the large spindle-shaped cornelian beads so common on the coast which he also states to be of value as a Deo Monnee. I have procured, and after grinding them a little sent him a supply of various kinds of bazar and European beads amongst which no doubt some may be found to possess the peculiar characters entitling them to be considered as sacred.

Geological and Mineralogical.

I have the pleasure to announce here a new mineral discovered by Captain Newbold in the Kurnool district, and which I have named Newboldite.

It has also the rare merit of establishing a new family of Minerals, viz., one of the double sulphurets of the metals and earths, it being a compound of bi-sulphuret of Iron with some earth, which may possibly be new, but being obtained in very minute quantities I am unwilling to pronounce upon it decisively.

I have put the mineralogical and chemical details into a separate paper for the Journal, as they would not interest the meeting.

Major Jenkins has sent us a few specimens of boulders from Sudiya, amongst which is a very fine specimen of Talcite or Nairite, which is an addition to our Mineral Cabinet.

LIBRARY.

The following books have been received since the last meeting.

PRESENTED.

Results of Astronomical Observations made during the years 1834, 1835, 1836, 1837, and 1838, at the Cape of Good Hope, by Sir John F. W. Herschel.—BY HIS GRACE THE DUKE OF NORTHUMBERLAND.

The Transactions of the Royal Irish Academy, Vol. XXI. part I.—BY THE ACADEMY.

Proceedings of the Royal Irish Academy, Vol. III. parts I, and II.—BY THE ACADEMY.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the months of August and September 1847.—BY THE DEPUTY SURVEYOR GENERAL.

LeMoniteur des Indes-Orientales et Occidentales, Tome II. No. 3.—BY THE EDITOR.

Pre-eminence of the Vernaculars ; or the Anglicists answered : being four letters on the Education of the people of India. By B. H. Hodgson, Esq.—BY THE AUTHOR.

The Calcutta Christian Observer, for September and October 1847.—BY THE EDITORS.

The Upadeshak, Nos. 10, 11.—BY THE EDITOR.

The Oriental Baptist, Nos. 10, 11.—BY THE EDITOR.

The Journal of the Indian Archipelago and Eastern Asia, Nos. II, III.—BY THE EDITOR.

Journal of the Royal Asiatic Society, Vol. X. part II.—BY THE SOCIETY.

Jahrbucher der Literatur, for 1846.—BY BARON VAN HAMMER PURGSTALL.

The Journal of the Royal Geographical Society, Vol. XVII. part I.—BY THE SOCIETY.

The Quarterly Journal of the Geological Society, No. 11.—BY THE SOCIETY.

Tatwabodhini Patricá, Nos. 50, 51.—BY THE TATWABODHINI SABHA.

Bulletin de la Société de Géographie, Troisième série, Tome VI.—BY THE SOCIETY.

The Oriental Christian Spectator for October 1847.—BY THE EDITORS.

Zeitschrift der Deutschen morgenlandischen Gesellschaft herausgegeben von den Geschäftsführern. Heft II.—BY THE EDITOR.

EXCHANGED.

The Edinburgh New Philosophical Journal, No. 85.

The London, Edinburgh and Dublin Philosophical Magazine, Nos. 205-6.

Journal of the Agricultural and Horticultural Society, Vol. VI. part I.

The Athenæum, Nos. 1027-30,-31,-32,-34,-35.

PURCHASED.

A Comparative Grammar of the Sanscrit, French, Greek, Latin, Lithuanian, Gothic, German, and Slavonic Languages, by Professor F. Bopp. Translated from the German by Lieut. Eastwick, and conducted through the Press by Professor Wilson. 2 Vols. 8vo.

Travels in New Zealand ; by Ernest Duffenbach, M. D. 2 Vols. 8vo.

Memoirs of the Life and Administration of Sir Robert Walpole, Earl of Oxford ; with original correspondence and authentic papers, never before published. By Wm. Coxe, 3 Vols. 4to.

Traité de Chimie, Appliquée aux Arts ; par M. Dumas, vols. 1 to 8, and a 4to Atlas.

Lá Sidérotechnie, ou l'Art de Traiter les Minéraux de fer pour en obtenir de la Fonte, du Fer, ou de l'Acier ; par J. H. Hassenfratz. 4 Vols. 4to.

De la Richesse Minérale, Considerations sur les Mines, Usines, des différens Etats présentées comparativement, 1. Sous le rapport des produits et de l'administration, dans une première division, intitulée *Division Economique* ; 2. Sous le rapport de l'état actuel de l'art des mines et usines, dans une seconde division, intitulée *Division Technique* ; (avec une atlas in folio, par A. M. Heron de Villefosse.

The Birds of Australia, by J. Gould. Parts XXVI. XXVII.

The Atesh Kedah, or Fire Temple, by Hajji Lutf Ali Beg, of Isfahan,—Edited by N. Bland, Esq.

Journal des Savants, Juin et Juillet 1847.

The London, Edinburgh, and Dublin Philosophical Magazine, Nos. 126 and 130.

The Annals and Magazine of Natural History, No. 131.

The Edinburgh Review, No. 173.

The Calcutta Review, No. 15.

Vetálapanchavingsati, or the twenty-five tales of Vetála. 1 Vol. 8vo.

The North British Review, No. 14.

MUSEUM OF ANTIQUITIES.

Cannon and swivel Balls from a Hill Fort near Dhontola Khooda Ghaut Purgunnah, in the district of Goalpara, Assam.—Presented by W. C. Thorburn, Esq.

FOR DECEMBER, 1847.

At a meeting of the Asiatic Society, held on Wednesday, the 1st of December, 1847.

G. A. BUSHBY, Esq. in the Chair.

The proceedings of the last meeting were read and confirmed, and the accounts and vouchers for the past month submitted as usual.

The Senior Secretary sought and obtained permission to print the accounts for the past year previous to the next meeting—the meeting to be held on the 12th of January, to permit of the preparation of the Annual Report to be then brought forward.

Capt. Rogers, R. N., Superintendent of Marine, was duly ballotted for and elected a member of the Society.

Read letters from Dr. L. C. Stuart, withdrawing his name from the list of members.

To the Secretary, Asiatic Society, Calcutta.

MY DEAR SIR,—I am sorry that circumstances compel me to request that you will be good enough to accept of my resignation as a member, but beg you will continue to send me the Journal as heretofore.

May I ask whether I am not entitled to a copy of the Asiatic Researches? I trust that if in your power, you will meet my wishes, and if so, send the Vols. to the care of the Govt. Steam Agents at Allahabad.

I regret being compelled at present to withdraw from so distinguished a body, but trust hereafter to be enrolled as a member again.

Your's faithfully,

LUDOVICK C. STUART,

Asst. Surgeon H. M. 29th Regt.

Kussoulie, 5th November, 1847.

From the Librarian to H. M. the King of Prussia, forwarding several works presented to the Asiatic Society by the Minister of Public Instruction, and the Royal Academy of Sciences of Berlin.

To the Secretary of the Asiatic Society of Bengal, Calcutta.

SIR,—In continuation of my letter dated 10th June, 1845, I have the honor of forwarding to you a copy of the books mentioned below, intended for the use of the Royal Asiatic Society, and presented on behalf of his Majesty's Minister of Public Instruction and the Royal Academy of Sciences.

Adding a selection of books on behalf of the Royal Library, intended for the same use, I hope that these works may prove of sufficient interest to deserve a place in the library of the Royal Asiatic Society, and I beg you Sir, to accept the renewed assurance of the highest consideration with which I have the honor of being,

Sir,

Your obedient Servant,

DR. G. N. PIETZ,

*His Royal Majesty's Chief Librarian and intimate Counsellor of Government.
Berlin, 16th June, 1847.*

BOOKS PRESENTED.

1. *By His Majesty's Minister of Public Instruction :*
Corpus inscriptionum Graecarum. Vol. I. II. III., 3 Vols. fol.
Aristoteles. 4 Vols. 4to.
2. *By the Royal Academy of Sciences :*
Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin.
Jahrg. 1822—1844. 27 Vols. 4to.

3. *By the Royal Library :*

Klaproth, *Chrestomathie Mandchou*, 8vo.

EjUSD. *Supplément au dictionnaire Chinois-latin*, fol.

EjUSD. *Verzeichniss der Chinesischen und Mandschuischen Bücher und Handschriften der Königlichen Bibliothek zu Berlin*, fol.

Schott, *Fortsetzung des Vorstehenden*, 8vo.

Index librorum ad celebranda saecularia reformationis tertia, 8vo.

Index librorum quibus Bibliotheca regia Berolinensis aucta est annis 1835—1839.
4 Vols. 4to.

Entwürfe und Studien eines Niederländischen Meisters aus dem IV. Jahrhundert. quer, 8vo.

Beger, *Regum et Imperatorum Romanorum Numismata*, fol.

EjUSD. *Lucernae*, fol.

EjUSD. *Ulysses*, fol.

EjUSD. *Poenae infernales*, fol.

EjUSD. *Numismata Pontificum Romanorum*, fol.

v. Diez, *Denkwürdigkeiten von Asien. Bd. 1. 2.* 2 Vols. 8vo.

EjUSD. *Ermahnung an Istambul*, 4to.

EjUSD. *Ueber Inhalte und Vortrag des Königlichen Buchs.* 8vo.

Buch des Kabus. Uebersetzt von v. Diez, 8vo.

From Capt. Madden, B. A., Almorah, announcing the communication of an Essay on the Flora of Kumaon.

From the Officiating Deputy Surveyor General, forwarding the Meteorological Register for November.

From Mr. J. W. Grant, with extracts of a note from the Hon'ble Mr. Thomason, Lieut.-Governor N. W. Provinces, describing a graduating machine invented by Capt. Strange, 7th Madras Cavalry.

Simlah, 2d Oct. 1847.

MY DEAR MR. GRANT,—Captain A. Strange, 7th Madras Light Cavalry (now here on leave) is a very ingenious mechanic. His forte is the making of Instruments. He has made up himself here a very ingenious little machine for graduating scales. The surface to be graduated is moved not in the common way by a screw, but by a series of wheels, in fact by clock machinery. By its aid he can divide an inch into 1350 parts. He to-day brought me his machine and showed me its operation on the enclosed piece of speculum metal cast by himself. You will observe on it, three sets of scales. The longest and the most perfect was done with care in his own study. The middle and worst was done to-day amongst a room full of people, when the machine was hastily put up in my house, and was impeded by dust, &c. The set at the other extremity were done in his own house, but amongst many interruptions. The sets show divisions 270 to an inch and 1350 to an inch,

with figures. The machine is a mere model, and far from possessing the accuracy and finish which he could give it under greater advantages than he can have here. Now pray put the piece of speculum metal in your microscope and tell me what you think of it. If as I suppose, you will be much struck with Capt. Strange's ingenuity, pray show it to your scientific friends that his rare qualifications may be known. Perhaps if you were to show it round the room at some meeting of the Asiatic Society, it would attract attention.

J. THOMASON.

From Capt. Newbold, regarding a proposed translation of a Malayan History of Java, by M. Edouard Du Laurier, of the Asiatic Society of Paris.

You will be glad to hear that my talented and indefatigable correspondent Mr. Ed. Du Laurier, member of the Council of the Société Asiatique of Paris, is engaged in the Translation of a Malay History of Java. I give you his own words, and if the President or the Secretaries of the Asiatic Society or yourself can obtain him any subscribers I shall feel obliged.

“Je vais entreprendre en ce moment une grande publication celle de la grande chronique de Java, *جمہوریہ تاجاوا* rapporté de Batavia par Raffles, et que j'ai fait copier sur l'exemplaire de ce livre que m'a été communiqué par le conseil de la Société Royale Asiatique de Londres. L'ouvrage formera deux volumes un 4to et paraîtra en plusieurs livraisons.”

From Mr. Mansel of Calcutta, through Mr. Piddington, offering to repair without charge the ivory model of the Taj, if sent to his house for that purpose. Mr. Mansel's offer was accepted, and the thanks of the Society recorded.

From Col. Ousely, communicated by Mr. Piddington, enclosing sketches and an account of temples in Surgunge. (Directed to be published in the Journal.)

From Mr. Hodgson, received Dec. 1st, forwarding a comparative Vocabulary of the several languages or dialects of the Eastern sub-Himálayas, from the Kalee or Gogra to the Dhanser, with the written and spoken Tibetan, for comparison. (Directed to be published.)

From Capt. Vicary, Sabathoo, announcing the discovery of fossil bones in the “*Secondary formation*” of the Himálayas.

I am happy to announce the discovery of bones, the Fossil remains of Crocodiles, in the limestone beds near Subathoo. These are the first fossil bones which have been found in the “secondary formations” of the Himálayas. The bones

are accompanied abundantly with a species of *Cerithium* (or *Turritella*?) The locality is about four miles south of Subathoo. I had previously found some indistinct remains of either a Chelonian or Crocodilean character close to my own house. They were firmly imbedded in an intensely hard pudding stone. But my last discovery has placed the matter beyond all doubt.

The limestone beds (near Subathoo) are of little thickness, alternating with, and subordinate to, immense beds of a fissured and friable clay slate, which often contains calcareous matter, derived doubtless from the disintegration of shells originally imbedded in it, and of which the indistinct remains are often apparent; the slate often passes gradually into the limestone, and at such points only are casts of Fossils procurable. The central portion of the limestone beds is intensely hard, and although abounding in fossil remains, nothing can be individually detached.

In many places the limestone beds seem to be wholly composed of *Ostreæ*, but so firmly cemented together, that as yet I have been unable to obtain an entire specimen. In other beds casts of an *Astarte* like bivalve are most abundant, sparingly accompanied with *Turritella* and a few other spinal shells; specimens capable of identification are rare, although individuals are sufficiently abundant; the number of genera and species as far as I have yet noticed are few. *Ostrea* seems to be the only shell retaining a portion of its calcareous matter, all the others are casts. The bones are completely petrified, not a particle of animal matter remaining, and it is impossible to dislodge them entire. Part of a lower jaw showing six alveoli with broken off teeth, and a scapula, are among the most perfect I have been able as yet to disengage from the rock. I mean shortly to revisit the place and to renew my efforts to obtain good specimens.

W. VICARY.

Subathoo, 20th Nov. 1847.

The Council communicated a letter from the most Reverend Dr. Carew, Archbishop of Edessa, offering, in reply to an application from the Society, his suggestions and cordial co-operation in forwarding to His Holiness the Pope, the works once belonging to the Roman Catholic Mission in Thibet, and which Mr. Hodgson has procured from the Grand Lama for presentation to Pope Pius IX. The thanks of the Society were unanimously voted to His Grace the Archbishop, whose suggestions as to the mode of transmitting the books, were directed to be adopted; and a complete set of the Society's Oriental publications, Researches and Journal, to be forwarded at the same time for presentation to the Library of the Vatican.

Also extracts from a letter received by Dr. O'Shaughnessy from Professor Wilson, announcing the progress actually made in the home

edition of the Vedas, and offering his advice as to the Oriental works which the Society should undertake.

* * * * * We have begun the printing of the Rig Veda, at Oxford, the Court having most liberally engaged to defray the cost. The Academy of St. Petersburg proposes to print the Yajur, and a Dr. Weber has been here several months collating MSS.; a Dr. Benfey is about to print the text of the Sama Veda. Still there will be plenty of work for the Society if they have any members qualified to conduct it. There are many and very extensive supplementary portions which it would be desirable to have printed, but nothing should be printed without a commentary. The Satapatha Brāhmaṇa for instance, would be an excellent subject for their money and their industry. There can be little doubt I think if the grant be not withdrawn, the Society will be expected to apply it strictly to the objects for which it was sanctioned, and to furnish regular accounts of its appropriation. Natural History is unquestionable a legitimate subject of the Society's researches, but it must not be the exclusive one. Man must claim his share of attention as well as birds and reptiles. I hope better things from the future.

H. H. WILSON.

East India House, Sept. 17, 1847.

Further, a letter from Dr. Roer, declining, under the circumstances stated by Dr. Wilson, to proceed any further with the edition of the Veda on which he has been engaged, and proposing to follow Dr. Wilson's valuable suggestions.

TO DR. W. B. O'SHAUGHNESSY,
Senior Secretary, Asiatic Society, Bengal.

Dated Asiatic Society, 8th Nov. 1847.

SIR,—Having perceived from a letter of Professor Wilson, that the printing of the Rig Vēda has been actually commenced upon at Oxford, I consider it my duty to propose to the Council, that the Society should discontinue their edition of this Vēda.

From the letter above alluded to it also appears, that the Yajur Vēda is to be published in Russia, and the Sāma Vēda in Germany.

Under these circumstances I would suggest, in accordance with the wish of Professor Wilson, as the most appropriate application of the Oriental fund, the printing of Sanskrit works, connected with the Vēdas; first of all of the Satapatha Brāhmaṇa, as proposed by Professor Wilson, Yāskas Nirukta and Nighanta, &c. &c. As, however, our Library contains a few portions only of this Brāhmaṇa, and as it will take a long time to collect the MSS. for this purpose, I propose in the meantime to publish an edition of the ten Upanishads (as they are called *κατ' ἐξοχὴν*) or the philosophical part of the Vēdas. This work, as the foundation of the Vēdanta and the most ancient record of philosophy that has been handed down to us, is

fully worthy of the patronage of the Society. Some Upanishads have been published before, but neither a complete edition of this appeared nor one equal to the subject. The Asiatic Society possesses some splendid MSS. of the text, with the commentary of Sankarácarya and a gloss of Ananda Giri. The edition should give the text with English translation, the commentary complete, and such portions of the gloss as illustrate passages not sufficiently explained by the commentary, or as establish another view of the text.

It will be some satisfaction to me, and I believe also to the Society, if the part of the Rig Véda which has been completed, be laid before the public, and I therefore propose to print it on my own responsibility by subscription, if the Society enables me to do so by subscribing to a certain number of copies. I venture to hope, that this proposition will meet with the approval of the Society, which will, I am convinced, sympathize with my disappointment in having laboured many months for an undertaking which must now be abandoned.

I have the honour to be,

Sir,

Your most obedient Servant,

E. ROER,

Co-Secretary, Asiatic Society.

The Council proposed with reference to these communications, that the Oriental Section be solicited to report upon the subject to the January meeting, and that the portion of the Veda already edited by Dr. Roer, be published with the Journal, as a specimen of the contemplated Bengal edition, and at the expense of the Oriental Fund. This proposal was unanimously adopted.

Mr. Piddington read a notice of the rolled balls of coal found in the Burdwan mines, (to be inserted in the Journal.) He also exhibited specimens of Galena presented by Capt. Sherwill from the south of Bhagulpore, and a model of a large diamond in the possession of the Nizam, a notice of which will appear in an early number of the Journal.

Report of the Curator Museum of Economic Geology for the Month of November.

Geology and Minerology.—I have put into the form of a paper for the Journal the results of the examination of a specimen of Ball coal from the Burdwan Mines which we obtained with the series of specimens from that quarter presented to the Museum of Economic Geology by Mr. Williams, and these results are highly curious as Geological data, for they seem to prove the existence of beds of coal of the same quality as the present ones, *but formed long before them* and then broken up and rolled by streams as boulders into the present deposits, whilst they were in

the act of forming, just as we might suppose the Mississippi, now rolling fragments of coal into the Gulf of Mexico, to be deposited in coal beds now forming there. This is a lapse of time at which the imagination is startled, but if the accounts given by Mr. Williams that these balls are found of all sizes up to 18 inches or more in diameter in coal beds, be correct, there seems no other way of accounting for them, for they are distinctly rolled, or at least rounded fragments formed like the other coal in layers. Mr. Homfray, I observe, has noticed these balls as rolled by the attrition of water, but the question of how they can have been deposited, is one of first interest with reference to the time we have hitherto supposed necessary for the formation of coal and its superincumbent strata.

Economic Geology.—We have received from our always active contributor, Captain Sherwill, two specimens of lead ore, of which he says :—

“ I send by steamer as it is too heavy for banghy, two lumps of Antimony ore embedded in a decaying or oxide stained quartz rock, which is found to the south of Bhagulpore. As I am busy from morning to night with business connected with my survey, I must defer furnishing any information I may possess upon its locality, extent, &c.”

This ore contains a portion of Antimony and of Arsenic, but a much larger one of lead, so that it is much more properly a lead and not an antimony ore. Without destroying the specimens we cannot obtain a good piece for analysis, and I have thus only noticed it temporarily (intending to refer to it again) but desirous that our friend Captain Sherwill should have his discovery announced, assuming that it is a new locality, which I believe it to be.

LIBRARY.

The following books have been received since the last meeting :—

PRESENTED.

La Rhetorique des nations Musulmanes d'après le traite Persan, intitulé Hadayic ul-Balagat, par M. Garcin de Tassy.—BY THE AUTHOR.

The Calcutta Christian Observer for November, 1847.—BY THE EDITORS.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of October, 1847.—BY THE OFFICIATING DEPUTY SURVEYOR GENERAL.

The Oriental Baptist, for December, 1847.—BY THE EDITOR.

The Upadeshak, No. 12.—BY THE EDITOR.

EXCHANGED.

Journal Asiatique, Nos. 43—4.

The London, Edinburgh and Dublin Philosophical Magazine, No. 207.

PURCHASED.

The Annals and Magazine of Natural History, No. 132.

The Curator in the Zoological Department gave his usual report on the acquisitions to the Museum during the past month.

Report of Curator, Zoological Department.

The following presentations have to be recorded this evening.

1. H. E. Strickland, Esq. Oxford. A small collection of English mammalia, birds, and reptiles.

2. Dr. R. Templeton, of Colombo. Two living Monkeys, one an adult male of the Ceylon Hoonuman, the other a remarkably coloured female of *Presbytis cephalopterus*, (Zimmerman). The former I considered identical (p. 732 ante), judging from a not very good skin of a half grown animal examined some time ago, with *Pr. priamus* of the eastern and western ghats of the peninsula; but a glance at the living animal suffices to show its distinctness from that and the several other allied species which have been confounded under *Pr. entellus*. At Mr. Elliot's suggestion, it may be designated—

Pr. thersites, Elliot, (Pl.—fig. 3.) Adult male inferior in size to that of *Pr. entellus* (verus) of Bengal, Orissa, and Central India; of an uniform dusky-grey colour (devoid of fulvous tinge) on the upper parts, darker on the crown and fore-limbs, and passing to dull slaty-brown on the wrists and hands; the hair upon the toes whitish or dull white: no crest upon the vertex (as in *Pr. priamus*), nor does the hair there form a sort of transverse ridge (as in the living *Pr. entellus*): face surrounded with white, narrow over the brows, the whiskers and beard more developed than in the other *entelloid* Indian species, and very conspicuously white, contrasting much with the crown and body, which are darker than in *Pr. priamus* (as I remember was the smaller specimen which I examined formerly). The strongly contrasting white beard is indeed the most striking feature of this Ceylon species, as compared with its near congeners.

The specimen of *Pr. cephalopterus* is a most gentle creature, as were another that I formerly possessed, and a third which I had opportunities of observing: all three being females. The two last (one of them now set up in the museum) had the body black, slightly grizzled; croup, tail, and exterior of thighs, albescent, palest on the croup and end of tail: head rufescent-brown, a little tinged with blackish on the sides; and the whiskers, and short hair on the chin and lips, were dull white, conspicuously contrasting. The specimen now sent by Dr. Templeton is of an uniform dark brown colour, passing to dusky on the hands and feet; the head rather paler and more rufescent, and the whiskers and hairs of the chin and lips whitish; the croup, outside of thigh, and tail, are comparatively but slightly paler and albescent. The skin of a male sent by Mr. Jerdon, (procured also in Ceylon, to which island the species seems to be restricted,) is marked as in the others, but is of a much lighter and rufescent brown colour, darker on the hands and feet, and the croup and tail are fulvescent-whitish: its crown, and especially the long hairs of the occiput, are paler than the back. The general colour of this last specimen is, indeed, that which is confined to the head only of black individuals; while in Dr. Templeton's live specimen, the usual colours are nearly blended

into uniformity; the white whiskers, however, remaining the same in all, as well as the circumstance of the croup and tail being much paler than the rest, and more or less albescent, the tip of the latter being usually whitish or sullied white. *Pr. Johnii*, (Fischer), of the Nilgherries, is a species closely allied in its colouring to the black examples of *Pr. cephalopterus*; but the former attains a much larger size, and its tail seems to be always black, and whiskers dark brown, concolorous with the crown. The expression of the countenances of these two species, when living, is exceedingly dissimilar.

The *Presbytis thersites* and *Pr. cephalopterus*, *Macacus sinicus* (v. *pileatus**), and *Loris gracilis*, appear to be the only species of *Quadrumana* indigenous to Ceylon; the three Monkeys seeming to be confined in their distribution to that island. The *Inuus silenus*, to which Ceylon has generally been assigned as the habitat, does not occur there in the wild state; but inhabits the neighbouring provinces of Travancore and Cochin on the mainland of India.†

* This is the *Rilawá* of the Cingalese; and *Pr. cephalopterus* is, I believe, the *Wandura*, corrupted into *Wanderoo*, which has been transferred to the *Inuus silenus* by Europeans. In Major Forbes's "Eleven years in Ceylon," II, 144, we read that—"At Newerra Ellia, and scattered over the colder parts of the island, is a species of very large Monkey of a dark colour: some of those I saw were much bigger than the *Wandura*; and one that passed some distance before me, when resting on all four feet, looked so like a Ceylon Bear, that I nearly took him for one." This I presume to have been the *Pr. thersites*; or could it have been *Pr. Johnii*?

† Dr. John Davy remarks, of the animals of Ceylon, that—"In respect to the mammalia, I am not aware that any species unknown on the continent of India is to be found in Ceylon, though there are several unknown on the latter, that are common on the continent; for instance, the Royal Tiger, the Wolf, and different species of Antelope." (*Travels, &c. in Ceylon*, p. 78.) The "Tiger" so often mentioned by Col. Campbell and others is, I believe, the Cheetah (*Felis jubata*); which name (or *Cheeta Baug*) is in Bengal applied to the Leopard. Besides the three Monkeys, however, above noticed as peculiar to Ceylon, I suspect must be added the *Paradoxurus zeylanicus*, (Schreber, of which Dr. Templeton has sent me a young specimen on loan, and the identity of which with the allied Philippine species, *Martes philippinensis* of Cameli, vel *Par. aureus*, F. Cuv., I doubt exceedingly); and, according to Mr. Elliot, the *Sciurus macrourus*. *Vespertilio pictus* (verus), identical with Javanese specimens, occurs in Ceylon, and probably in the Indian peninsula also; where, however, it seems to be generally replaced by an allied species, which I take to be *Kerivoula Sykesi* of Gray. Of the Squirrels, Mr. Elliot writes—"There is no example of *Sc. palmarum* in Ceylon that I could see, whereas *Sc. tristriatus* is abundant. The *Sc. macrourus* is quite different from my Travancore specimen which you have identified with it (p. 869 ante). I saw many skins of *macrourus* in Ceylon, all differing in a remarkable manner from each other in their disposition and shades of colour, and all differing from mine of which the mixed grey tint is uniform, and also the belly ochrey. The one this most resembles is the *Sc. pygerythrus* of Belanger's Voyage, and I think it will probably turn out to be

3. W. C. Thorburn, Esq. of Goalpara. A few snakes, shells, and insects, from that locality.

4. R. W. G. Frith, Esq. A living specimen of *Manis pentadactyla*, L. (v. *brachyura*, Erxl., &c.), procured in Chota Nagpore. This interesting animal arrived in Calcutta in a very weak state, having (as I believe) taken no nourishment from the time of its capture, about eight days (or more) previously; and Mr. Frith kept it two days, without his noticing any food that was left with it, or the ants'-nests to which it was taken, though it lapped water freely: it was then made over to me, turned loose into a covered enclosure from which it could not escape even by burrowing, left at liberty to burrow, and a mess of chopped meat and egg, mixed with boiled rice, was left with it, which it ate heartily of during the night; and that I believe was the cause of its death the following day, after its long previous abstinence. I mention these details to show how another living Pangolin should be treated: for I have little doubt that I could have got it to live, had it not been so far exhausted. The gait of this animal was remarkable, and gave altogether another notion of the creature from what could be derived from any published figure of it I have seen: the back is much arched, and the limbs straight and pillar-like. The walking figure in pl.—was sketched from life;* and the other figure represents the attitude in which it died. It showed little disposition to burrow in the ground, as I apprehend from weakness; but was content to bury the fore portion of its body, leaving the croup and tail exposed above the surface. Both skin and skeleton have been set up, and the internal parts preserved in spirit.†

In XI, 453 *et seq.* (1842), I treated of the genus *Manis*, enumerating, as established species, the *M. pentadactyla*, L.,—*M. Temminckii*, Smuts (of S. Africa, nearly allied to the preceding species),—*M. javanica*, Desm.,—and *M. tetradactyla*, L. (v. *macroura*, Erxl.),—which are all the species that are noticed in M. Schinz's *Synopsis Mammalium* (1845). I described, however, upon that occasion a *M. leptura*, nobis; and Mr. Gray has since described a *M. multisculata* from W. Africa (*Proc. Zool. Soc.* 1843, p. 22), of which Mr. Fraser has given an interesting notice (*ibid.* p. 53). *M. leptura* has the tail as long as the head and body, of more slender form than in a species received by the Society from Java (but

the same." In the birds, at least three fine species of *Gallinacea* seem peculiar to Ceylon, viz. two Jungle-fowls, one of which I take to be *Gallus Lafayetiei*, and the other is *G. Stanleyi*, Gray; and the so called Red-legged Partridge of Ceylon, *Galloperdix bicalcaratus*, (Pen.), which is quite distinct from *G. lunulatus*, (v. *Hardwickii*, v. *nivosus*), of Continental India.

* The plate, however, is less characteristic than the original bare outline sketch.

† Dr. Cantor (in XV, 259,) describes a peculiar structure adherent to the outer coat of the stomach of the Pangolin of the Malayan peninsula, which did not exist in the above specimen of *M. pentadactyla*; neither can I find a trace of it in a full grown foetus of the Pangolin of Arracan, examined for the purpose; the Arracan Pangolin being closely allied to, if not identical with, the Malayan peninsula species.

which I doubt is the true *M. javanica*), and much less broad at base; the series of medial and lateral caudal scales amounting to 30 or 31: underneath the tail, a succession of series of seven scales each may be counted diagonally across, in the direction of the tip, from the second and third lateral of the two sides respectively, to the eleventh and twelfth respectively from the base; then successive series of six scales each, as far as the seventeenth and eighteenth. All the scales are much worn; but allowing for this, the series of lateral caudal scales have evidently been always much smaller than in the Javanese species, and their tips are appressed in the specimen (to all appearance normally so), so that the lateral margin of the tail is nearly smooth, instead of being very prominently serrated as in the other. The scales of the head, neck, and exterior of the fore-limbs are excessively ground down in the specimen; and those of the upper part of the tail have their tips broken away, so that the triple row of them presents a series of hexagons to the view, very unlike what is exhibited by equally worn specimens of the several following species. The scales upon the exterior of the limbs are also considerably more numerous in *M. leptura*, especially on the hind-limbs; the claws of the fore and hind feet are equally developed, the middle one especially being large and powerful: and the auricle (in the stuffed specimen at least) is nearly obsolete. Altogether, this species presents a marked approximation to the long-tailed Pangolins of Africa. Its habitat remains to be ascertained.

M. javanica, Desm. Two specimens in the Society's museum, received long ago from Java, differ equally from *M. leptura* and from the presumed Javanese specimen before adverted to; while they agree well with the description of *M. javanica* in the *Dict. Class.* The tails of both are unfortunately imperfect; but at the base of the tail underneath, a good character presents itself, which readily distinguishes this species from every other I have to compare with it. The diagonal series of sub-caudal scales, commencing from the base, comprise but six scales each, for the first two series on the one side, and one only on the other, followed by a succession of series of five scales each, for about the basal half of the tail, which is all that is preserved. The anterior claws are extremely large, especially the middle one, and even the next outer; while the posterior claws are small: the auricle is well developed: and the bristles at the base of each scale are more so than in either of the other species. If full grown, too, which they are or nearly so, the size is much inferior to that of either of the other species. The description in the *Dict. Class.* gives the length as $1\frac{1}{4}$ ft. exclusive of the tail, which measures 1 ft. 1 in.; and this is about the size of the Society's two specimens.

M. leucura, nobis, n. s. This species is common in Arracan, and I am assured that it also occurs in Sylhet, to the exclusion of *M. pentadactyla*. Seven or eight specimens examined had, without exception, the terminal portion of the tail, varying from about one-third to half, of a glaucous-white colour, abruptly contrasting with the rest. The auricle is distinct, equally developed with those of *M. pentadactyla* and *M. javanica* (apud nos): the claws are of moderate size, and nearly as

much developed on the hind feet as on the fore:* the series of body scales varies from 15 to 17 across, according to the part of the body; and the lateral caudal scales amount to 28, alike in four specimens under examination: underneath the tail, the two first diagonal series from the base consist of seven scales, the three next of six scales each, and the remainder of five each to near the tip. Only the lateral scales of the body, and those of the hind-limbs, are distinctly carinated, even in the very young animal; those of the fore-limbs are very slightly so, and the lateral scales immediately posterior to the fore-limbs are not carinated. The largest specimen measures little more than 3 ft., of which the tail is 17 inches: the latter is moderately broad and flat at base, of much lighter form and more tapering than in *M. pentadactyla*.

Lastly, the large *Manis* received from Java differs very little from the last, except that the auricle in the stuffed specimen (the skull having been taken out, and the skin of the head stretched out of all shape,) appears nearly obliterated; and the terminal portion of the tail is not glaucous-white, as in all the Arracan specimens. I suspect that it does not specifically differ from the latter; and that this is the Malayan species referred to *M. javanica* after Schinz, by Dr. Cantor in XV, 259; being apparently also that figured by Marsden.

On comparing together the skulls of *M. pentadactyla*, *M. javanica* (apud nos), *M. leucura*, and *M. leptura*, I find an exceedingly close resemblance between those of the two former, and of the two latter species, respectively. The skull of *M. javanica* is of a still less attenuate form than that of *M. pentadactyla*, but otherwise exceedingly similar, the most prominent difference consisting in the greater size of the auditory bullæ; the antero-posterior diameter of these, in *M. javanica*, being equal to the space between them and the extremity of the occipital condyles; whereas, in *M. pentadactyla*, their longitudinal diameter scarcely exceeds half that space. The skulls of *M. leucura* and *M. leptura* are much narrower and more attenuate than in the preceding, but agree in size, and the differences between them are very slight: the most prominent is the considerably greater breadth of the occipital foramen in *M. leptura*, as shown by the further separation of the condyles, however the orifice itself may have been enlarged to facilitate the extraction of the brain; the intermaxillaries are also broader in *M. leucura*.

5. Wm. Bracken, Esq. A skin of the *Ornithorhynchus paradoxus*.

6. Capt. Prior, 61th N. I. Three specimens of Lizards from Beloochistan, with examples of the common *Belostoma indica*. The former I intend to describe, when I can get figures taken of them for publication.

7. E. O'Ryley, Esq. of Amherst. A small collection of reptiles from that vicinity, with also a specimen in spirit of *Sorex Peyrottetii*, Guérin, v. *pygmaeus*,

* I have heard it remarked that the claws of a *Manis* are always more developed in the young than in the adult animal: but we have all ages of the present species, and I observe a marked uniformity in this respect; and in Mr. Frith's *M. pentadactyla*, about half-grown, the proportions of the claws are the same as in the adult.

Hodgson. Mr. Gray identifies this minute Shrew with *S. pusillus*, S. G. Gmelin, *Reise* III, 499, t. 75, f. 1, and suggests it to be the *S. pygmaeus*, Pallas, *S. exilis*, Gm. *Syst. Nat.*, and *S. caecutiens* v. *minutus*, Laxm. It certainly has a wide range in India, for it has been obtained in the Nilgherries, and in a cellar at Madras, Major Wroughton has presented us with a specimen from Almorah, and we now have it from the Tenasserim coast.*

8. Willis Earle, Esq. A few quadrupeds and birds from Tenasserim, which had been put into spirit that has since evaporated, leaving the specimens quite dry. Among them is a *Cuculus*, intermediate in size to *C. micropterus* and *C. poliocephalus*, and according best with Mr. Hodgson's *C. saturatus*, which differs from *C. micropterus*, Gould, chiefly in its smaller bill, like that of *C. canorus*; if it be not, indeed, the veritable *C. micropterus* of Gould.

Also an interesting collection of fishes and some sea snakes, *Crustacea*, &c., procured at the Sandheads; which collection supplies a few species not previously in the museum. Likewise two large specimens of the common Cobra.

9. From the Barrackpore menagerie. The carcass of a Leopard.

10. From Baboo Rajendro Mullick. A dead Swan (*Cygnus olor*, L.)

11. Dr. Theodore Cantor. A few horns of Himalayan ruminants.

12. J. Pybus, Esq. A frontlet and horns of the Sambur (*Cervus hippelaphus*), with the beam simple or not forked,—thus corresponding to *C. niger*, Blainville, v. *Rusa nipalensis*, Hodgson.

13. Dr. E. Roer. A small Cobra.

14. An officer of the 'Bussora Merchant.' The head and vertebral column of a Shark, procured at the Sandheads.

E. BLYTH.

The Society's large collection of European specimens of *Vertebrata* was exhibited at the meeting; and Mr. Blyth's supplementary Report on the subject and his similar Report on the collection of Australian *Vertebrata* exhibited at the last meeting, will be published separately from the Journal of the Society.

The thanks of the Society having been unanimously voted for all contributions and communications, the meeting adjourned to the 12th of January, 1848, when the Annual Report will be submitted and Office-Bearers elected for the ensuing year.

* Here may be remarked that I have this evidence of the existence of a small brown *Sorex* in Lower Bengal, about the size of *S. araneus*, that I once found the remains of one in the stomach of an *Elanus*, shot about 60 miles above Calcutta.

Monument to the late Lord Metcalfe, a Vice President of the Asiatic Society of Bengal.

The Editors gratefully insert a fac simile with which they have been favored by Mr. Bushby, of the tablet lately erected in Winckfield Church, Berks, to the memory of the revered LORD METCALFE. The inscription is from the classic pen of Mr. Macaulay.

Lord Metcalfe was elected a member of the Asiatic Society on the 4th September 1819—a Vice President on the 2nd of January 1828. His exertions for the advancement of the Society and the promotion of the noble ends it should pursue, were cordial, constant and effective. Many of his most intimate friends became members of the Society at his instance. He advised and encouraged them to active co-operation in its labours. The correspondence and records of Government, on all scientific and literary topics, were by his directions rendered freely available for publication under the Society's auspices.

After a separation of several years, while the ruler of another vast dependency of the British Empire, where this great and good man designed to found an Institution for the advancement of similar pursuits, the writer of this brief notice heard him refer with pride and affection to the Asiatic Society of Bengal as the model by which he desired to construct the Institute of Canada.

While busts and portraits record the services of other Vice Presidents of the Society, the insertion of this slight memorial will at least evince that the grave has not obliterated the grateful sentiments with which the memory of LORD METCALFE should be held among us.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Nov. 1847.

Days of the Month.	Maximum Pressure observed at 9h 50m.						Minimum Pressure observed at 4 p. m.						Rain Gauges.		Moon's phases.
	Barometer reduced to 32° Fahrenheit.	Of the Air.	Of the Mer.	Temperature.	Wind.	Aspect of the Sky.	Barometer reduced to 32° Fahrenheit.	Of the Air.	Of the Mer.	Temperature.	Wind.	Aspect of the Sky.	Upper 40 Feet	Lower 40 Feet	
1	Inches 30.010	83.0	77.0	N. W.	Direction from sunrise to 9h 50m.	Clear.	Inches 29.899	86.0	84.0	70.0	N.	Clear.	..	..	..
2	.021	82.5	83.0	78.0	N. W.	Ditto.	.912	87.0	83.5	74.0	N.	Ditto.	..	..	..
3	.022	80.5	81.0	73.1	N. W.	Ditto.	.917	85.0	84.0	71.1	N.	Ditto.	..	..	..
4	.048	77.2	77.0	71.8	N. W.	Ditto.	.931	83.5	82.0	69.8	N.	Ditto.	..	..	..
5	.069	79.0	77.8	71.8	N.	Ditto.	.946	83.5	83.0	69.0	N.	Ditto.	..	..	..
6	.040	79.1	79.3	71.4	N.	Ditto.	.904	85.5	83.6	70.0	N.	Ditto.	..	..	..
7	29.941	78.7	79.0	75.0	E.	Cloudy.	.838	77.0	77.0	75.0	E.	Drizzly.	4.56	4.66	☉
8	.851	78.5	79.2	77.0	S.	Nimbi.	.766	81.5	81.0	77.2	S.	Cumuli.	0.84	0.93	☉
9	.956	78.2	77.8	73.0	N.	Cumuli.	.920	78.0	77.0	67.5	N.	Ditto.	..	..	..
10	30.012	76.0	75.0	72.0	N. W.	Ditto.	.920	79.0	77.8	68.8	N. W.	Ditto.	..	..	..
11	.022	78.0	76.8	77.0	N. W.	Cumulo strati.	.924	78.8	77.0	64.5	N.	Clear.	..	..	..
12	.041	74.5	74.1	67.0	N.	Clear.	.898	79.2	77.8	66.4	N.	Ditto.	..	..	..
13	.032	75.0	75.1	72.0	N.	Ditto.	.883	79.5	78.2	65.3	N.	Ditto.	..	..	..
14	.001	75.5	75.2	70.5	N. W.	Ditto.	.800	80.5	79.2	70.2	N.	Cumulo strati.	..	..	☾
15	29.972	75.0	75.2	67.3	N. W.	Ditto.	.788	82.0	80.3	69.6	N. W.	Cumuli.	..	..	☾
16	.972	76.9	76.7	69.6	N.	Clear.	.652	82.8	81.2	72.5	N.	Ditto.	..	..	☾
17	.982	78.0	78.0	72.0	N. W.	Cirro strati.	.862	83.0	81.0	69.5	N.	Ditto.	..	..	☾
18	.982	78.4	77.8	69.8	N.	Clear.	.888	82.0	80.3	69.0	N.	Ditto.	..	..	☾
19	.996	77.6	77.8	69.2	N. E.	Clear.	.899	81.6	81.2	70.8	N.	Ditto.	..	..	☾
20	.974	77.8	77.8	70.0	N.	Ditto.	.919	82.6	81.3	70.2	N.	Cloudy cirro cumuli.	..	..	☾
21	30.027	80.0	79.0	70.8	E.	Cloudy.	.909	83.5	82.5	68.8	N. W.	Clear.	..	..	☾
22	.039	79.8	80.0	68.0	N. W.	Clear.	.889	80.0	78.5	67.8	N.	Cirro cumuli.	..	..	☾
23	29.997	80.0	79.5	70.0	N.	Cirro Cumuli.	.889	81.4	80.2	66.9	N.	Cirro strati.	..	..	☾
24	30.044	78.8	78.7	68.0	N. E.	Clear.	.918	80.5	78.3	66.5	N.	Clear.	..	..	☾
25	.045	76.6	76.2	67.3	N.	Ditto.	.959	79.9	78.2	66.9	N. W.	Ditto.	..	..	☾
26	.050	74.9	74.6	65.4	N.	Ditto.	.890	80.5	78.9	67.2	N.	Cumuli.	..	..	☾
27	.008	74.9	75.0	67.4	N.	Ditto.	.895	80.3	78.6	67.3	N.	Ditto.	..	..	☾
28	.006	75.0	74.7	67.9	N. W.	Cumulo strati.	.917	79.9	78.2	66.5	N.	Clear.	..	..	☾
29	.024	75.3	75.7	65.4	N. E.	Cirro cumuli.	.935	80.8	79.4	66.2	N.	Ditto.	..	..	☾
30	.055	73.0	73.7	65.9	N. W.	Clear.							..	..	☾
Mean	30.006	77.6	77.5	70.5			29.892	81.5	80.1	69.2			5.40	5.59	

ERRATA.

PART 1ST.

<i>Page</i>	<i>Line</i>	
301	12	for Triunba read Trúmba.
„	19	for Sherí at el Beitha read Sherí 'at el Beitha.
302	4	for Tarimyer read Tarmíyeh.
„	12	for Jeddiah read Jedídah.
„	18	for Jeddiah read Jedídah.
303	10	for After “When it bore East” read On the right bank, &c.
„	17	for Khíyat read Khayt.
„	24	for Jeddiah read Jedídah.
„	3	for (in note,) Keif read Kúf.
„	6	for Nhar read Nahr.
304	8	for bending read trending.
„	18	for Dojin read Doj'm.
„	3	of note, Seghimeh read Seghirmeh.
„	4	for Sir read Sú, and for Tau read Táúk.
„	67	for Hamria read Hamrín.
„	11	for Hamrool read Hamrín.
„	13	for Physens read Physcus.
„	„	Last of note, Opio read Opis.
305	23	for Daláhee and Lagros read Daláhu and Zagros.
„	24	for Malwujep read Malwíyeh.
306	28	for approached read approach.
„	29	for was read is.
307	1	for Siel el Azeez read Sid 't Azeez.
308	3 & 5	for Maluryeh read Malwíyeh.
309	9	for passing read passes.
„	25	for Malwújeh read Malwíyeh.
313	19	for Hebla read Kebla.
315	3	for round read mound.
„	6	for Shiragoor read Shirazoor.
„	2	of note, “Ustrima” read “Ustrina.”
„	13	for Sammariah read Samarra.
„	18 & 22	for Dina read Dúra.
„	28	for Sammariah read Samarra.
316	19	for this read thus.
„	24	for present read personal.
317	9	for Yet alíj read Tel alíj.
„	10	for Apis read Opis.
„	22	for Mahrwan read Nahrwán.
„	24	of note, for it read is.
„	29	for Zellar read Tellúl.
„	37	for Malwryeh read Malwíyeh.
318	17	for had read hove.
319	16 & 17	for after the numerals ° and not t.
„	16	for Mahirgeh read Malwíyeh.

Page	Line	
319	21	for Abri Delif & Maluryeh read Abú Delif Malwíyeh.
„	24	for Majainmah read Májammah.
„	25	for On the east side, &c. read On the east side.
„	26	for Mahrwan read Nahrwán.
322	12	of note, for analysis read anabasis.
„	23	for M. Batta read M. Botta.
323	12	for Asperiall read Aspinal.
„	21	for “Durn” read “Dum.”
325	25	for Tekriths read Tekritlís.
326	11	for “Al’arab” read “Al’Arab.”
„	14	for Tekrith read Tekritlís.
„	24	for a Scorpü read α Scorpü.
„	13	for Khanisah read Kanísah.
327	2	for Arnin read a ruin.
„	3	for Kamsah read Kanísah.
„	4	for “El Tet’bha” read “El Fet’hha.”
„	6	for S. W. read N. W.
„	4	of note, for (Tageit) read (Tagrit).
328	1	for easting read casting.
„	13	for Khalidj—fresh sentence, Observing, &c.
„	24	for Extending to the Eastd. read Extending to the Eastd. from it ;
„	1	of note, for “E. Seliva” read “El Selwa.”
329	2	for Mejiris read Nejiris.
„	„	for Nejin read Nej’m.
„	6	for gazing read grazing.
„	8	for tints read tents.
330	6	for “El Tettha” read “El Fet’hha.”
„	9	for Makhal read Mak’húl.
331	31	for Maluryah read Malwíyeh.
„	34	for Tholush read Tho’líyeh.
332	11	for Trumbee read Trúmba.
„	12	of note, for Al Athus read Al Athur.
„	14	for Bukhtyari read Bakhtiyárí.

ADDITIONAL ERRATA IN PART 2D.

614	16	for POTAMIDA read POTAMIDÆ.
621	23	for <i>biporcatus</i> read <i>porosus</i> .
623	note,	for <i>Geckotidæ</i> read <i>Geckonidæ</i> .
643	3	for on the Pinang read in the Pinang.
656	5	for <i>Polycopodium</i> read <i>Polypodium</i> .
909	14	for $3\frac{3}{8}$ inch read $0\frac{3}{8}$ inch.
921	30	for HEXAHONOTUS read HEXAGONOTUS.
927	6	for <i>catenularies</i> read <i>catenularis</i> .
929	5	for Dryiphis read Dryiophis.
1066	11	for <i>twelveth</i> read <i>twelvth</i> .

NEAR THIS STONE IS LAID

CHARLES THEOPHILUS, FIRST AND LAST LORD METCALFE
A STATESMAN TRIED IN MANY HIGH POSTS AND DIFFICULT CONJUNCTURES.

AND FOUND EQUAL TO ALL

THE THREE GREATEST DEPENDENCIES OF THE BRITISH CROWN

WERE SUCCESSIVELY ENTRUSTED TO HIS CARE

IN INDIA HIS FORTITUDE, HIS WISDOM, HIS PROBITY AND HIS MODERATION
ARE HELD IN HONORABLE REMEMBRANCE

BY MEN OF MANY RACES LANGUAGES AND RELIGIONS
IN JAMAICA, STILL CONVULSED BY A SOCIAL REVOLUTION,

HE CALMED THE EVIL PASSIONS

WHICH LONG SUFFERING HAD ENGENDERED IN ONE CLASS,

AND LONG DOMINATION IN ANOTHER

IN CANADA, NOT YET RECOVERED FROM THE CALAMITIES OF CIVIL WAR

HE RECONCILED CONTENDING FACTIONS

TO EACH OTHER AND TO THE MOTHER COUNTRY.

PUBLIC ESTEEM WAS THE JUST REWARD OF HIS PUBLIC VIRTUE

BUT THOSE ONLY WHO ENJOYED THE PRIVILEGE OF HIS FRIENDSHIP
COULD APPRECIATE THE WHOLE WORTH OF HIS GENTLE AND NOBLE NATURE

COSTLY MONUMENTS IN ASIATIC AND AMERICAN CITIES

ATTEST THE GRATITUDE OF NATIONS WHICH HE RULED

THIS TABLET RECORDS THE SORROW AND THE PRIDE

WITH WHICH HIS MEMORY IS CHERISHED BY PRIVATE AFFECTION

HE WAS BORN THE 30TH DAY OF JANUARY 1785

HE DIED THE 5TH DAY OF SEPTEMBER 1846

6
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